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OF

NATURAL HISTORY:

EXHIBITING A VIEW OF THE

PROGRESSIVE DISCOVERIES

IN

INDIAN GEOLOGY, ZOOLOGY, BOTANY,

AND

Other branches of Natural Science.

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THE

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OF

NATURAL HISTORY.

The Natural History, the Diseases, the Medical Practice, and the Materia Medica of the Aborigines of Brazil, by DR. VON MARTIUS. *Translated by* JOHN MACPHERSON, ESQ., *Assistant Surgeon.*

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Catarrhal affections.

Catarrhal affections manifest themselves chiefly by diarrhœas from the bowels, by pleuritic attacks, inflammation of the throat, eyes or ears, and by Parotitis: but abdominal affections are the most frequent.

These catarrhal attacks are commonly ushered in by fever: but the Indian is not on the whole much inclined to such violent developments of nature's reactive powers. Parotitis produces the strongest febrile symptoms. It causes violent constitutional fever, and the Indians are more afraid of this than of any other disease, as it always ends in tedious suppuration, at times in sloughing.

The Indians who live in the western provinces, suffer most from such catarrhal attacks, which often appear epidemically, especially after a dry cold south-west wind has blown

for a long time over the continent, or when north-east winds suddenly change to the south-west. At such times catarrhal fevers often occur, which are very dangerous to children, and often kill them with symptoms of suffocation: a bad kind of influenza. The Indians along the coast of the eastern provinces often suffer from such sudden changes of wind, and from the cold sea breeze; and Dr. Paiva of Bahia assured me, that the fresh east winds, which there serve to invigorate Europeans and white men in general, and indeed in the neighbourhood of the sea are considered beneficial in incipient phthisis, act unfavourably on the Indian population.

While the Indian is by such influences easily exposed to catarrhal complaints, he suffers from rheumatic ones in a much less degree. The latter, which have their seat chiefly in the serous membranes, and the muscles, appear to have less foundation in the constitution of the Indian than in that of the white and black races. No doubt by catching cold, and by exposure to draughts of air after full meals, or by passing the night in damp forests, violent pains in the limbs (called Curimentos by the Portuguese) are often produced. But these darting, tearing or lancinating pains, which often take away the free use of the limbs, and in a few hours render a healthy man stiff and motionless, frequently attain such a height, as to become dangerous to life, and require the most careful treatment by powerful diaphoretic and anti-spasmodic medicines, and at times by free venesection. They are especially common about full-moon, and, in the neighbourhood of the sea, about the time of spring tides, are aggravated at night, and often interfere with the liver and nerves of the abdomen, apparently by gouty metastasis. So far however as I knew, these rheumatic affections are rare among Indians. The insensitive pituitous constitution of the red man seems to predispose much less to rheumatic than to catarrhal affections, the latter characterised by abundant secretions.

Diseases of skin.

Besides these catarrhal affections, certain cutaneous diseases appear to arise from the causes just indicated, for instance Nettle-rash, Pemphigus, and Zona. They are almost always ushered in with gastric or bilious complications, with or without distinct pyrexia, and are slight and have no disagreeable sequelæ.

A widely spread disease in the country is an erysipelatous form of disease (*erythema vulgare*, of Bateman) which is called by the Portuguese, Sarna. It does not attack whites only, who are often for a long time much annoyed by it, but the red race also. The latter however seem less predisposed to it, and throw it off more readily, perhaps, as in them it is usually the consequence of excess in eating. Indeed this chronic erysipelas, which often produces painful ulcers, seems to be generally connected with imperfect digestion and impaired secretion of bile. But many people ascribe it to irritation from the sting of insects, and especially of the so-much dreaded musquitoes. It is indeed no wonder, that the naked Indian, exposed day and night to the attacks of this blood-thirsty insect, suffers more than the Brazilian provided with clothes. In the northern districts, especially along the Amazon and its tributaries, where the Indian is during the greater part of the year persecuted by the small gnat (Simuleum pertinax) all day, and by the long-legged musquito (Culex molestus) all night, it is no wonder that his whole body at times exhibits bloody spots, which by the continued re-application of the sting, and the intolerable itching, cause a peculiar form of eruption. It is called, *piera*. It presents spots of skin, in some places raw or superficially ulcerated, in others covered with light crusts and scales of blood. They occur on all parts of the body, oftenest on the back, on the shins, and the calves of the legs. A burning pain, and an intolerable smarting make this affection so great an evil, that the European cannot help feeling sympathy with the

sufferer, when he remembers the effects of the gnat on the uncovered portions of his own body.

It fastens on his skin, and raises the epidermis immediately into a vesicle, into which is poured a drop of blood, which then dries up, so that by the third day it can be removed by a needle like a dried-up pustule. The insect, which only stings in the light of the sun, causes no pain when it begins to suck. But afterwards a burning itching sets in, which is quite disproportioned to the number of stings, and drives the European, unaccustomed to it, almost mad, while the Indian bears it with placid equanimity. The constitution often sympathises. Feverishness, loss of appetite, headache and swelling of the inguinal glands set in, and in unfavourable cases frequently end in suppuration, but more commonly in resolution after a few days. This *piera* must, from its general diffusion over the greatest part of Brazil, and from the simultaneous epidemic attacks which it makes in whole districts, be considered one of the peculiar diseases of these lands.*

But besides it, the Indians are subject to various other skin diseases; among the most common, is a chronic painless psoriasis, in the Tupi language, *Curuba* (or when it occurs in animals *Pyruça*) which attacks chiefly the joints of Indians living in the plains; and the face, the head, and the feet of those who inhabit forests. It is remarked in general, that such eruptions take on moist forms among the inhabitants of woods, and drier ones among those of plains. I have observed a quite peculiar disease, (which must be reckoned a kind of ichthyois,) among Indians of the race of Puru-Purus. The whole body appeared studded with irregular, generally round, isolated or confluent blackish spots of various sizes, which to the hand gave the feeling of slight indurations of the skin, and did not yield any cutaneous discharge,

* Musquitoes are troublesome enough to new arrivals in this country, and often cause irritative fever.—*Tr.*

although their surface was uneven, and rougher than the rest of the skin. The vicinity of the spots was frequently paler than the sound skin; in some cases, almost quite white. These patients suffered from enlargement of the liver. This disease of the skin is said to be hereditary, and is considered by the neighbouring races a national sign of the Puru-Purus, the Amamatis and the Catauixis, on which account they go by the name of 'the spotted.' Perhaps this disease may be derived from the amphibious life of these savages, their bad food, and the custom of anointing themselves with crocodile, or Lamantin fat. In the same neighbourhood, I also saw a cachectic Indian of the race of Catauixis, who had on his face and arms many white spots and points, and was distinguished besides by an almost morbidly excessive growth of hair. This disease too is said to be hereditary, nay infectious also: individuals who have laboured for some time under any of these various skin diseases, have a cachectic appearance, which distinguishes them at first sight from their healthy neighbours. The uniform copper red colour changes into a dirty yellow, or into a characteristic livid paleness, and a muddy heavy look pervades their dark eyes. In such cases the hair gets gray, earlier than is usual, in the American race. In general the Indian preserves his straight, shining black hair up to his 60th year, without any perceptible alteration. The women become gray earlier than the men. I may here take the opportunity to mention a very peculiar disease of the hair, which I observed not in Indians, but in a woman of mixed Indian and European blood. Long hairs grew under the cutis of the arms and knees, and developed themselves with suppuration, and though pulled out, renewed themselves from time to time. I saw her at Joazeiro on the river S. Francisco, where common salt effloresces from the soil, and she reminded me of the disease called Wolosez, which occurs on the Don, at Tscherkask and in other places in the south of Russia, where the soil

contains salt, and which consists in hairs growing out of wounds.

I have also observed a kind of athrax, and of painful boil among these Indians.*

Febrile diseases.

I pass to the consideration of febrile diseases. Among them, I must first name the acute exanthemata, small-pox and measles, for they are among the worst plagues of Brazil. To them, to syphilis, and to excess in the use of brandy, is the great mortality of the red man to be ascribed.

Small-pox.

According to all accounts, this disease was entirely unknown to the inhabitants of Brazil before the arrival of the Portuguese. But now it has penetrated into the deepest wilds with fearful celerity and the most calamitous results, and every tribe knows and fears this disease as the most deadly poison to its blood. In the Tupi language, it is called Merébɑ-ayba, *i. e.* the bad disease. Unfortunately it must be told, that the European settlers in many districts, for instance in the interior of the provinces of Maranhaô and Pernambuco, have with fiendish cunning contributed to bring the plague among the Indians, and thereby devote a harmless population to the most frightful death. Where the Indians have attacked the settlements of the Portuguese with the purpose of robbery, plunder or murder, there the colonists have hung up in the woods shirts and other pieces of clothing poisoned with small-pox, and fearfully realized the fable of Nessus. The Indian is, by his constitution, ill formed for the development of small-pox. The eruption of the exanthema is slow and difficult. Racked with violent headache, and burnt up with heat, the Indian usually rolls himself up in his hammock, and strives carefully

* This account of cutaneous diseases is not very complete: we are much in want of a distinct history of those prevailing among the natives of India.—*Tr.*

to exclude every breath of air, and thus increases the violence of his fever, or rushes into a running stream in which he hopes to quench his inward fire. In it he often dies of apoplexy: but others, who keep quieter, often do not live till the eruption appears, but die previously of violent delirium. In other cases the outbreak of the exanthema is accelerated by cold baths or by hot drinks, and it appears to such an extent, that the whole surface of the body is like one huge sloughing sore. In some again large spots of inflammation are formed under the cutis, which sometimes pass into putrid suppuration, and sometimes cause metastasis to the head or the lungs, and cause death after the most horrible symptoms: but even the common forms of the exanthema are bad enough; the uniformly coloured regularly formed pustules are often attended with a very painful cough, and attacks of Angina. In other individuals, we see besides regularly developed pustules, others which are fallen in, wrinkled, black or with black spots, or the whole body is covered with a black exanthema. The disease attacks individuals of every age and sex, but it is especially dangerous to elderly people of atrabilious and sluggish temperament, to pregnant and parturient women, and is on the contrary got over more easily by people of a younger and healthier age. Women, seized with small-pox, frequently miscarry: parturient ones communicate the disease to their offspring: no wonder then, if the Indian is seized with the dread of certain death, as soon as he feels the poison in his veins, or sees any of his family attacked by it. Thus, small-pox plays the same part among the red men that the plague does in the East. Wherever it appears, all family ties are dissolved: the sick are often left alone without help; while those who are well, stricken with blind terror, fly bereft of their senses into the woods. The Governor General of Estado do Pará was once with all his staff in a vessel that was to convey him from Para to Macapa.

He had one and twenty Indian rowers. They suddenly got the alarm that there was a case of small-pox in the ship, when they instantly sprang overboard, into deep water and made for the shore, leaving the Europeans to shift for themselves. Dobrizhofer relates of some of the wild Indians, that on intelligence of the approach of small-pox, they do not fly in a straight line from their homes, but double about in all directions, thinking thus to be more likely to escape their deadly foe. In the year 1819 an epidemic of small-pox prevailed in Pará, from which about 8000 men suffered, and of which at the worst time 36 to 68 died daily. The epidemic which in the year 1734 attacked the thirty settlements of the Jesuits in Paraguay, was a fearful one. Of the population then estimated at 140,000 souls, 30,000 died. In the year 1765, when the settlements were increased to thirty-two, 12,000 Indians died. On the whole it is to be observed, that the epidemic is always more virulent where many people live close together, than where the huts are single and scattered, and this is of course more common among Indians than European settlers. Experience has also hitherto proved, that the worst small-pox epidemics, which have worked the greatest havoc among the red men, have *originated from newly imported negroes*, and gradually spread inwards from the coast. This too was the case with an epidemic in Pará in 1819, which was introduced by a slave ship from the N. W. coast of Africa.

We observe few Indians with small-pox marks, as most of them die under the disease. Blind and deaf Indians were in some places the only remains that I found of whole villages. The Brazilian doctors assume, that under the most favourable circumstances one-fourth of those attacked are saved.

It is on the whole proved by general experience that mixed races, negroes, and white men, get through the disease much more easily than the Indians.

Measles.

This too is a very pernicious and widely spread disease among the Indians, (called by the Portuguese Sarampo, and in the Tupi language Mixùa-Rana, i. e. false small-pox.) A Brazilian missionary tried to prove to me that this disease also was unknown to the aborigines before the arrival of Europeans, and the accounts which I got from the Indians on the Yupurá, seemed to confirm it. But the declarations of Doctor LaCerda and others, made me think it more probable that measles must have prevailed among the Indians before that event. The disease is especially common among children before the warm rainy season, spreads epidemically with great impetuosity, and commonly kills in the first stage with symptoms of violent inflammatory fever; hooping cough and dropsy are frequent sequelæ.

Scarlet fever.

This or an exanthematous disease very like it, appears also epidemically from time to time on the banks of the Amazon and the Rio Negro. But it is more dangerous to the white and mixed population, than to the red.

Fevers.

Now as regards simple fever, it has been already remarked, that the sluggish, unexcitable constitution of the Indian, and the slight energy of his nervous system do not predispose to such forms of disease as are borne specially by the nervous system, or at least reflected by it. The most marked character observable in this respect, is the want of distinct periodicity in his disease. Intermittent fevers are thus more rare than remittent, and tertians are less frequent than quartans. In the exacerbations, stupor and heaviness are more common than regular pyrexia. Typhus fever with highly developed affections of the nervous centres is rarer than that which bears the character of synochus. Their fevers are often accompanied with cutaneous eruptions, and frequently with gastric and bilious complications. An

unfavourable termination frequently occurs suddenly, with colliquation and dysenteric evacuations.

The belief that periodic diseases depend much on the phases of the moon, is exceedingly common among the Indians, and that they are more violent at new and full moon, than during the first and last quarter.* In the neighbourhood of the Amazon stream the belief is prevalent that all feverish complaints are more dangerous when the waters are high, (from December to April) than at other seasons; somewhat analogous is the popular belief on the east coast of Brazil, that all fevers have stronger exacerbations during the flood than during the ebb, and that the spring tides, which occur when the moon is passing the meridian, are very dangerous. At such seasons fever patients are said to die frequently from sudden apoplexy. Piso has remarked this.

Chronic inflammation of the liver.

The most common fever of a bad kind, from which not only the Indians, but all the inhabitants of Brazil suffer, sets in with the symptoms of synochus with biliary complications. It is at bottom a chronic inflammation of the liver, which under certain circumstances puts on a febrile character, sinks back again to a chronic state, and after repeated exacerbations generally produces in the end a fatal result, by disorganisation, induration or chronic suppuration of the liver: at times, along with general putrid fever, at times with dropsy; more rarely, with the rupture of the larger vessels, or sudden mortification.

All the injurious influences already indicated and the heat of the climate predispose to this disease. It is one of the most common among the Indian as well as the civilized population, especially in low, damp, steamy neighbourhoods, as along the course of the Madeira, the Tocantin and the Amazon. From simple loss of appetite with a feeling

* No one suffers long in this country from intermittent fever, without having impressed on him the belief in lunar influence.—*Tr.*

of oppression in the hypochondria, and a slight remittent fever, up to the most violent inflammation and its worst terminations, this disease presents an uninterrupted chain of the most varied phænomena, according to the individuals, the locality, the accidental complications and the duration of the disease. It involves the most different organs, and developes itself in the most different ways accordingly. While its beginning can often be checked by a few purgatives and a careful diet, in its higher degrees it defies the skill of the physician; and the great mortality of the Indians, who know no remedy with which to protect themselves, is chiefly to be ascribed to this disease. The (Baços) fever cakes which appear as the most common result of this disease, are so common in many districts, that one cannot help considering it as endemic, as goitre is in others.* The whole of my boat's crew on the Yupurá was often afflicted with liver cakes of such a size, that they were perceptible to the eye without the aid of feeling; the whole aspect of these patients betrayed at first sight the deeply rooted nature of the malady. They were pale, ill coloured, gloomy, listless and without appetite, and shewed the greatest repugnance to their ordinary diet dried fish, salt-meat, beans, and Mandiocca flour) and an increased craving for brandy. It was melancholy for me to be scarcely able to do any thing for the wretched condition of these people, who would have required long and careful treatment, and instead of receiving this, fled to their woods, where they were only threatened with a still quicker death. Men between the ages of 30 and 50 seemed most subject to this disease, probably from their unsettled mode of life: women less so; I have however seen boys and even children suffer from it.†

* For the sake of uniformity it would be very convenient if we could make out these liver cakes to be spleens. Enlarged liver is not often observed, while enlarged spleen is exceedingly common among the natives of Bengal.—*Tr.*

† Lallemant, an intelligent physician of Rio Janeiro, describes a similar disease, in which he says the heart is enlarged, instead of the liver.—*Tr.*

Chronic stomach disease.

With this disease which although it is at first slow, afterwards progresses with the most acute symptoms, two other affections of the digestive organs are associated, regarding the nature of which I still remain much in the dark. The one is the condition which the Brazilians call Engasco. It is a peculiar kind of indigestion, characterised by a heavy feeling of over-repletion, by continued belching, joined with rumbling and griping in the stomach, occuring after meals, and attended by a constantly diminishing power of making fresh blood. Women are especially subject to this condition, and it often might be described as hysterical dyspepsia or Anorexia. Raw coarse food eaten in excess seems to be the commonest cause of this disease, nostalgia is another cause, when Indians are retained by settlers as labourers, in a condition foreign to their usual mode of life. When the disease is once established, they have often a constant craving to eat, the* mud of rivers, the lime from the walls, or pieces of wood. This disease is even still more common among negroes, and individuals of mixed negro blood, and is common at places along the coast, where the planters can neither by warning nor by punishment break young slaves, who have once acquired it, of the habit.

Spinela.

The other chronic disease of the digestive organs, which I have several times observed in Indians, especially among the civilized offshoots of the Tupis in Bahia, Pernambuco and Maranhão, is a bending inwards of the ensiform cartilage of the sternum. Piso described this disease (edit. 1658, p. 36,) as being endemic there, and called by the Portuguese Spinela; he called it a *Prolapsus Cartilaginis mucronatæ.*

*The river clay which I saw Indians in the neighbourhood of Coari eat, contains according to Ehrenberg's microscopic investigations, the following polygastric infusoria with silicious coats, Eunotia Bidens, turgida, gallionella granulata? Himantidium arcus, of silicious earthy plants, amphidiscus Martii, A. Rotula, spongiolithis aspera, Sp. inflexa, Sp. rudis, spongilla lacustris.

It is probably the result of rickets, and the immediate consequence of organic alterations in the vicinity of the digestive organs. Dr. Paiva told me that he had observed in the bodies of those who had died of this disease, great varicosity of the coronary veins of the stomach, and Piso remarked that they could be recognised at first sight by lumps in the arms. The inhabitants often complain for months, nay for years, of a shooting or burning pain in the region of the heart, which is greatest when the stomach is full, and at times becomes quite intolerable. It increases after every full meal, and after all violent movement of the body. At the same time there is an increased secretion of mucus in the stomach, and in some individuals a great tendency to the production of acid. To get relief from the violence of the pain, the patient lies down in a horizontal position on his back or on his side. At times the pancreas sympathizes, as seems to be shown by an immense quantity of saliva and mucus coming up into the mouth. The habit of the patient is cachectic, and reminds one of a spleen case. After several years suffering, dropsy or putrid fever sets in.*

Save this remarkable one, which deserves a thorough investigation on the part of the Brazilian doctors, I have not observed any form of disease among the Indians, which I can describe as being of a rachitic nature. Yet it is not rare to see children in a state of atrophy, reminding us of the scrofula of Europeans.

These are the victims of neglect, especially in cases where their mothers have died. Infants at the breast and small children are by these savages abandoned almost wholly to the care of their mother. While she, with the love of an ape,†

* I have lately met with a strange case apparently of ossification and eversion of the ensiform cartilage, the end of which may be felt projecting against the skin a little to the right of the mesial plane, the affection has been coming on gradually for a year or two, it causes acute pain after a full meal, the man is otherwise healthy, and well-made.—*Tr.*

† So in the original.—*Tr.*

bestows on her infant not the care of a single year, but continues lactation till it is four or five years old, no one else in the house cares the least for the little one, and if it be deprived of its mother, it is always neglected, and falls away into the most miserable condition. Such unlucky children not unfrequently die of hunger; if they are able to maintain a wretched existence, they remain in a state of weakness and of atrophy resembling that of the neglected children of European manufacturing populations. If, however, they live long enough to attain the power of supporting themselves, they appear suddenly to regain their lost ground. I at least have never seen boys or girls of the age of 12, who had not the usual strength and cheerfulness of the red man. The only exception to this, was in the case of such girls, as, on the appearance of the catamania, suffered from the strange mismanagement, which is commonly adopted. In many cases the girl is at that period subjected to a three weeks' fast. She is removed from all intercourse with the tribe, made to lie alone on a sort of scaffolding at the top of the hut, and there allowed only water and a little fresh cooked fish for nourishment, so that in this wretched penitentiary she is often starved down almost to a skeleton, and for a long time afterwards suffers from the consequence of such unnatural privations.

Syphilis.

It is well known that this disease has made great ravages among the Indians. It has penetrated into the remotest districts, and like an eating worm gnaws at the marrow of these devoted people, who use against its violent inroads only a few vegetable medicines, and yet gain more by their use, than from the treatment of the European doctors, who continue to use mercury far too freely. I have observed among the Indians along the Amazon rapid infection and rapid spread of the disease. If improvement did not take place soon and decidedly in the hands of the doctor, the infected

used to fly in despair to the woods, after which I never could get further accounts of them. The Indians themselves believe universally that syphilis was introduced by the Europeans. It is unknown among communities which have not had intercourse with the Brazilians. Nevertheless I do not declare decidedly for the opinion, that syphilis is a disease of the old world.

The Indian suffers little from other diseases, which are especially connected with the assimilative and plastic processes. I have indeed observed a few cases of lymphatic swellings in the arm and knee joints, and also ankylosis of the lower extremities in a couple of old Indians, but it was the result of injuries not of constitutional disease.

Diseases of the Bones.

The bony framework of the Indian is slow in attaining its full strength and firmness. It is known, as Herodotus remarked, that the bones of the head of negroes are harder than those of white men, and the same is reported by Spanish writers of the Americans. And not only the first conquerors, but later observers have remarked that the bones of the skulls of Americans are of uncommon thickness, and resist the blows of Europeans better than the skulls of their own race do. But there can be no doubt that the bones of the pelvis and of the skull are exceedingly firmly knit together, and attain an unusual thickness; and in church-yards and charnels the bones of Indians may thence be distinguished from those of Europeans. The development of the teeth is also strong. Dentition is late in commencing, and slow in its progress. The second set of teeth are distinguished by the absence of that transparent milk-white colour, which is so commonly found among Europeans, especially in northern lands; they are rather of a yellowish-white shade, and little transparent; the enamel lasts long, and the old men generally lose their teeth by their gradually falling out, and seldom from partial decay:

this may possibly be owing to their hardly ever eating hot foods. Teeth and still more bone diseases are accordingly rare among the Indians. I have only seen a few diseases of bone, viz., *exostoses* of the fibula, which were treated with advantage by the juice of Euphorbiaceæ and fomenting with the leaves of a variety of pepper. Toothache among them is generally rheumatic, and seldom caused by caries of the teeth.

I have never seen curvature of the spine, club-foot, or other deformities of the skeleton. But it is probable, that when children are born among them with any such deformities, they are made away with immediately after birth. It is strange enough, and may serve as a trait in the moral constitution of these races, that the Indian always represents the spirit, called Gurupira, the terror of the woods, the product of his own superstition, and an enemy to man, with a club-foot, or with one growing forwards out of his chest. Lame and halt are occasionally seen: their ailments have always had a traumatic origin. Intentional limping, a result of civilization in our children, is unknown among the Indians.

Diseases of the organs of respiration.

They are comparatively speaking uncommon among the aborigines of America. They suffer very seldom from chronic lung disease, although now and then, galloping consumption is the consequence of acute chest affections, pleurisies and pneumonias. The open-chested build and the regular occupation of the Indian, who is hardened by regular exercise in the open air, and the mild pleasant climate, prevent the frequent occurrence of these diseases.

Gout.

Though well known as the chief disease among the red population in N. America, gout is here scarcely known, as the use of brandy has not yet spread itself extensively enough. This poison operates most injuriously on those communities of Indians, which though removed from Europeans, still have

trade with them. Every expedition brings brandy and its melancholy consequences among isolated tribes and villages: we however trace the destructive effect of spirituous drinks, and especially of new brandy made from sugar, less here, than among the more civilized Indians along the coasts of Bahia, Pernambuco, Parnaiva, Maranhâo and Pará. There, where there is the largest population of civilized Indians, brandy has exerted its baneful influence over large masses of people. Besides the corruption of morals to which it has led, it has had a material share in causing the ever increasing mortality, in augmenting the strange sterility of the Indian, and in increasing the quantity of liver disease.

Hœmorrhoidal affections.

They occur in various forms, and are frequently connected with the chronic liver disease, which they usually precede. As a characteristic and very frightful disease of this nature, I must mention a complaint which prevails in the low damp districts of the provinces of Maranhâa, Piauhy, Pernambuco, and Bahia, and is called Doença do Bicho, or Bicho do Cù, and was described long ago by Piso as the scourge of the population. The coast Indians call it Teicoaraiba, i. e. *anus rubens*. It consists in relaxation, protrusion, and finally gangrene of the rectum, and if not at once checked by the most active measures, leads invariably to a fatal result. This fearful disease is oftenest observed at the termination of epidemics of dysentery. I have remarked a carcinomatous form of it in horses in the province of Piauhy.

Diseases of the organs of the senses.

From what I have already said regarding the senses of the Indian, and of his miserably narrow sphere of existence as compared with that of civilized Europeans, we might presume that he is not subject to many diseases of the senses, and such is in reality the case.

The black, brown, or exceedingly rarely dark blue eye of the Brazilian savage displays in its dark glance, the clouded dreamy sunkenness of the race. It is often destroyed by injuries—but gray cataract is not common, and green or black are still rarer. Inflammation of the eye in consequence of extreme exposure to light, and to the smoke of their huts, occurs in those districts, in which the red man retires into darkened hovels to avoid the intolerable swarms of musquitoes, as is the case on the Rio Negro, and on several tributaries of the Solimões. But with this exception, the noble organ of vision enjoys, in the green glades of the forest, on the airy plains of the table land, away from the injurious stimuli of learning and of European civilization, never directed on the close type of a school book, or bent on a novel while the hands are employed in knitting,* never allowed the use of spectacles, of opera glasses or of microscopes,—a fortunate liberty, which can only improve its strength and soundness. What I have oftenest observed among Indians as well as negroes in these countries, is the *arcus senilis*, a circular thickening of a ring of the cornea round the pupil, and this, not as a consequence of advanced age, but of catarrhal inflammation.† From the use of bad diet, especially of salted fish on long water journies, the Indians are often attacked with slight inflammation of the eye, for which they commonly use the freshly expressed juice of the buds of the Ambaúba tree (Cecropia) as a wash. The ear suffers oftener than the eye among the autochthones of Brazil. I have seen several men and women quite deaf, or more than half so. In some I observed large scars from severe inflammation of the Parotid, and probably of the internal ear. They had come on at the termination of exanthematous fevers. The Indian takes little care of the delicate organ of hearing; he often has no covering to his head, and seldom wears

* Knitting, the eternal employment of German women.—*Tr.*

† We doubt much whether, there is ever a connexion between arcus senilis and catarrhal inflammation.—*Tr.*

a hat, so that the hot sun strikes directly on the external ear, which by night is either heated too much by close proximity to the fire, or catches cold from resting on damp leaves or sand. Hence catarrhal and rheumatic inflammation of the ear is common enough, chronic discharges from it are frequent. Here also people are quite aware of the fine sympathy between the organs which secrete the bile, and those which generate the bitter wax of the ear.(?) Erysipelatous forms of inflammation, and indeed the irritation of the sand fly, whose eggs are well known to produce most painful inflammation, frequently extend to the ear.

Mental diseases.

From these the Brazilian savage suffers very seldom; his dull senses, his brooding melancholy, and the absence of every thing that can awaken a higher and more refined spiritual life, readily explain how he remains a stranger to all those alienations of mind, which with us are caused by excited affections and morbid imaginations; indeed, if we except the momentary madness of drinking, and the rage of envy or of hate, there remains scarcely a passion, which could lead to derangement of mind in the Indian. But we occasionally observe cases of imbecility and of idiotism, which are probably caused by injuries of the head, or by internal diseases terminating unfavourably.

The only mental disorder, of which I have heard among the Indians, may be compared more readily with *lycanthropy* than with anything else, i. e. with that alienation of the mind, in which a man out of his wits from madness, rushes into the open air and imitates the voice and gestures of a dog or wolf, and becomes a wer-wolf, i. e. a wolf-man. Dobrizhofer gives a full account of the malady, and says that it only occurs among the tribe of Nakaiketergehès. I have however heard exactly similar accounts from missionaries and others on the Amazon. After the Indian has remained for some time pale,

syllableless, wrapt up in himself, wandering about with confused staring look, or withdrawn from all company, he breaks forth suddenly some evening after sunset, with all the signs of ungovernable madness and blind thirst for blood, he storms through the village, and sets on every one that he meets, he rushes howling to the spot where the dead are buried, tears up the soil, and throws himself down, or madly loses himself in the desert. This disease returns every 8 or 14 days, and ends in complete exhaustion, or passes into fever. It is said to have been observed to be epidemic, and to occur not only in men, but also in women, and especially after continued debauchery, drinking, dancing and excitements of all kinds. The Indians believe that witchcraft is its cause. The missionaries always considered the removal of the person affected from his community, as necessary to prevent its spreading.*

I have now related the most important particulars of what I have had the opportunity of observing, or occasion to hear from trustworthy parties regarding the diseases of the Indians.

Diffusion of disease according to different localities.

All these diseases are especially those of the tropical man, the nomad, the hunter, the stranger to European civilization. They are in many districts endemic, and then the red man shares them in a greater or less degree with his neighbours of other races. It is natural that a country of the extent of Brazil should not have the same climatic constitution in all parts, and that local diseases should accordingly undergo certain modifications. If we view the whole of tropical Bra-

* Catlin mentions something very similar among the N. American Indians. The belief in wer-wolves was common among the Romans, prevailed throughout Europe for many centuries, and is not yet extinct in some districts. The European superstition however makes no difficulty as to the actual conversion of the man into a wolf. The lycanthropy of the red Indian is no doubt at times epidemic, like the dancing and leaping mania of the American Jumpers, &c.—*Tr.*

zil in this point of view, we may recognize in this vast country a triple character as to disease.

1. The immense basin of the Amazon with its northern and southern tributaries. This river valley, the largest on the surface of the earth, following the equator in its chief direction from west to east, and also in that of its most important tributary the Madeira, from the 19° of South latitude to the equator, partaking every where of a true equatorial climate, is a low damp land. The overflowing of the rivers, and of the endless lakes and ponds in connexion with them, endure on the average for two-thirds of the year. There is no dry season here as in the other divisions; thick forests, always green, and incessantly attracting damp clouds, alternate with plains only, in the higher lying districts. Throughout the whole year day and night vary little in length; cold winds never prevail. In the later months of the year there blows in the chief basin of the Amazon, the wind called *the general*, an East wind, which is generally without any unfavourable influence on the constitution, since it cools without making people catch cold, and commonly diminishes the plague of musquitoes. Universal nature is here subject to that peculiar rest, that regularity in all the phænomena of terrestrial life, and to that beautiful harmony of the elements, which makes equatorial regions so attractive. The prevalent diseases correspond with these relations; feverish exanthemata, dysenteries, dropsies, obstruction of the liver, and of the portal circulation, and chronic inflammation of the liver prevail. All inflammations shew a venous or passive character; they are less strongly marked than in more southern climates; great failure of strength, and rapidly supervening colliquation render diarrhœas and dysenteries, which are often caused by catching cold, and by eating unripe fruits, especially dangerous. The infectious exanthemata spread with unusual violence. Dropsy in its various

forms, is the disease of which most Indians die; worm diseases in various complications are very frequent.

2. The physical conformation of the northern provinces, Ciará, Rio Grande and Paraiba do Norte, Alagoas, Pernambuco and Bahia is quite different. This large tract of country is perhaps the most healthy of all, but it is at present only inhabited along the coast by a few Indians, chiefly civilized offshoots of the Tupi race, and in the interior by a few small groups of tribes that have settled in it; it is a hot dry land, with less vegetation. The rainy season, which in the basin of the Amazon may be said to extend over the whole year, has its duration contracted here. It is often entirely absent for several years. The rivers, as compared with those of other districts, are poor streams. Their inundations are trifling, and have no such important effect on the vegetation and the general phænomena depending thereon. The land rises into hills or elevated table lands. It is much more exposed to the winds than the equatorial districts, and when they come from the sea coast, they often produce fever and diarrhœas; when they blow from the west or north-west, rheumatic and catarrhal affections and inflammations, especially of the eyes. The steady clearness and warmth of the atmosphere braces the nervous system. The dryness prevents the tendency to colliquation and putrid fever. This very favourable constitution of land and climate prevails almost every where. Only some of the larger rivers, especially the chief streams of the district, the Rio de S. Francisco and the Parnahyba, form an exception. In the neighbourhood of those rivers, and as far as the inundations and the pestilent effluvia connected with them reach, the chronic inflammations of the liver which have been already described prevail under the form of putrid and bilious fevers. They commence at the end of the inundations, and decimate the population in a fearful way,

the more because they never meet with judicious treatment. We see in these regions many individuals with fever cakes, who generally are at last carried off by dropsy or putrid fever. The Indians had formerly settled in large bodies along those streams, but like a few white colonists who afterwards migrated thither, perished by that malignant fever, (Malinas.) Along the upper Tocantin and on the Araguaya, which streams in this part of their course belong to this district, although their lower parts agree in climate with the Amazon region, there are still numerous Indian tribes, among whom at this day the Malinas from time to time works fearful ravages. This beautiful land is on the other hand remarkably beneficial to lung affections. They are exceedingly rare, and only occur at one or two spots, which are comparatively speaking less favourably situated, and are high and windy. Pernambuco is remarkable in this respect; it is the Pisa of Brazil; and the salubrity of the climate for patients with diseases of the chest is well known in England, and hectic patients sent thence to Olinda often experience great relief, even after their disease is far advanced.

3. The third well marked district for certain forms of disease, embraces the high lying provinces of Minas and S. Paulo, the mountainous part of Bahia which agrees in character with Minas, the thickly wooded provinces along the coast, of Porto Seguro, Espiritu Santo, Rio de Janeiro, S. Paulo and S. Catharina. The high lying places along the coast of Bahia, for instance its capital, may come under this head, in as much as from their vicinity to the sea they are also exposed to the rapid changes of temperature which characterise in general this division. This proportionately best peopled district, though now possessed of a large population only in its north-eastern forest parts, has a true tropical climate, like the other districts already described. But it is deficient in that fixedness and uniformity of climate, which makes the words—hot and damp,

sufficient to characterise the Amazon basin, and hot and dry, the north-eastern provinces. The latter of these climates the Brazilians call *clima agreste*, the former *clima mimoso*. In this part of Brazil then we have a high temperature during the dry, as well as during the damp season; both periods alternate with each other with great regularity, and in both we find sudden lowerings of temperature, which have their influence on the general health, and often modify it in a very striking degree; the elevated position of many localities, especially in Minas, which on the whole may be counted high land, the steep conformation of the coast Cordilleras, which seem thickly wooded through the greater part of this district, besides this the occurrence here of deep winding villages, there of wide-spreading table lands, in fine, the absence of extended river districts, and the preponderance of forest vegetation throughout the whole—all these circumstances unite to give this division of the country a separate character as to its diseases, which is made up of that of tropical as well as of extra-tropical lands. In consequence of this the catarrhal and rheumatic character is more marked, and is in a certain degree linked with the bilious. Violent catarrhs, diarrhœas that end in dysenteries, and inflammations of the bones, are here especially common. The strong winds which blow thither sometimes from the sea, sometimes from the interior of the land, the south and south-west, bring commonly acute muscular pains, pleurisies, and pneumonias. But here also diseases in which the liver and portal system are especially involved, are common, and a painful erysipelatous inflammation particularly of the lower extremities (Sarna) is one of the commonest evils. In Rio de Janeiro, Sarcocele and Hydrocele are almost endemic. The Indians of this district live in greatest numbers in the woods north of Rio Janeiro between the Rio Paraiba, Rio Doce and Rio Belmonte. Small-pox and measles have often made fearful ravages among them, and they seem to have suffered still

more than their countrymen on the Amazon. Besides the greater vicissitudes of climate, this circumstance may be partly a cause of it, that being closely shut in by the ever-spreading white population, they take less active exercise than in a freer state.

I must allude only cursorily to extra-tropical Brazil, which embraces a part of the province of S. Paulo and of Rio Grande do Sul, and may be looked on as a fourth division as regards the character of disease. Its Indian population is, comparatively speaking, small, and it generally belongs to the Southern tribe of Tupis, the Guaranis, and has been more or less disturbed by the influence of the neighbouring Spanish missions, of the former Jesuit settlements. The character of its diseases approaches that of the districts last described, but the inflammatory rheumatic character is more prevalent.*

General result regarding the diseases of the Brazilian savages.

If we now combine into one point of view the outlines of the flying picture which I have sketched, the following will be found to be the essentially characteristic points:—

1. The Brazilian Indian has scarcely any disease, that belongs to him peculiarly.

2. He shares with the other classes of the population the diseases prevailing there through climatic influences. His system reacts against these diseases in an analogous way to that of the European, only with such difference as might be expected from his natural constitution: and the characteristic traits of his race are found in the diseases to which he is most subject.

3. In his proportionately salubrious land, the Indian knows no more than the European settler of the plague, of cho-

* We believe that no attempt has been made at a general classification of the climates of the continent of India.—*Tr.*

lera, of the yellow fever, of the frightful putrid fevers of the west of Africa, or of the *Vena medinensis.*

4. The disease introduced by Europeans, the small-pox, causes the greatest mortality, and the sterility* inherent in his race is increased by syphilis, which was originally unknown to him.

5. We may thence assume that the race of the red man is naturally a very healthy one: (its longevity is well known,) but this only as long as it is the exclusive possessor of its own country, and not disturbed by European civilization.

6. But, as things have changed since the arrival of the Portuguese, a constantly increasing rate of mortality has been observed. The only race of men, regarding which, one can from preceding facts lay down a general prognosis, is the American. In this prognosis, which pronounces the extinction of the red man, the aborigines of Brazil also share.

This melancholy view of things, against which the feelings of the philanthropist struggle, has but too much foundation in the state of medicine among the red race, for when we consider the matter a little more, it becomes quite plain, that the savage is in no condition to discover for himself the appropriate remedies for the physical evils from which he suffers. Then again he is, from his social condition, quite beyond the reach of any beneficial operation of the medical knowledge introduced from Europe.

* Dr. Lallemant attributes this sterility to the mere phlegmatic cold and indifferent nature of the red man. He has lately written regarding the diseases of the neighbourhood of Rio Janeiro, but we have not hitherto had an opportunity of comparing his accounts with those of Von Martius.—*Tr.*

(To be concluded.)

Description of an Electro-motive Engine, by Inspector General J. MACLEOD, *of the Madras Medical Service. Communicated by Dr.* F. MOUAT. *Pl.* iv.

[*Note by Dr.* MOUAT.—Mr. Macleod is well known in the Madras Presidency, as an able and excellent practical chemist and mechanic, who has devoted considerable time and attention to such subjects. The ingenious instrument described, which works exceedingly well, may be applied to a variety of useful purposes, and the power multiplied to any extent by increasing the strength of the battery, and size as well as number of the magnets. Few subjects connected with the arts have recently attracted more attention than the application of electro-magnetic power to supersede steam in its infinite uses and appliances. One of the greatest difficulties and barriers to its success has been completely overcome by Mr. Macleod, whose paper we have no doubt will excite considerable attention among those engaged in similar inquiries in Europe.]

The discoveries made of late years in electro-magnetism, more especially the extraordinary power imparted to soft iron by means of the galvanic current, have given rise to various ingenious attempts to apply the new agent as a motive power. All these attempts, however, appear to have been unsuccessful. (See Mechanics' Magazine, January 1844, page 61.) I have tried the arrangements of Devonport, Jacobi, Davidson and Taylor; and though small models or toys can be made to work by either of them, I am inclined to think that it could easily be explained, why they have not been found to answer on the large scale.

The space over which electro-magnets exert any considerable power being very limited, and by far the greatest portion being exerted close to the magnet, it is evident that none of this last can be sacrificed without the loss of a considerable proportion, if not the greater part, of the power, together with a corresponding waste of materials.

I do not find it stated at what distance from each other the rotating and fixed magnets were placed in Devonport's and

Jacobi's engines. The workmanship may indeed be so perfect as to bring them very close without actual contact. But the expansion and contraction of iron by change of temperature, renders it exceedingly difficult to adjust them so close as delicacy of workmanship might otherwise admit of. These disadvantages appear also to be augmented by enlarging and multiplying the parts composing the engine; and in proportion, the loss of power and waste of materials will be greater. However this may be, nothing short of actual contact can render the whole power available, which is evidently impracticable in the rotating engines.

These considerations naturally suggest the plan of causing the keeper to be attracted and repelled alternately, this obvious movement being made to act as a motive power. In this case, however, the limited distance at which the electro-magnet acts is by no means the only difficulty,—the adhesion of the keeper,* even when contact is broken, is another, which is not obviated by changing the poles. It occurred to me, however, that by means of the mechanical contrivance hereafter described, and availing myself at the same time of the *residuum power remaining for a moment in all electro-magnets*, that the keeper could always be separated from the magnet the instant it came in contact with it; that by using the contrivance, alluded to, the keeper never could adhere to the magnet, and thus the strokes could be repeated rapidly with the full power of the engine. This plan answers perfectly.

I informed Mr. Palmer of Newgate street, of the result of the above arrangement, in a letter dated 20th November 1843, and his reply is dated the 28th December following.

In my model there is no changing of poles, and the keeper can be made to strike the face of the magnet from 150 to 200 times in a minute, with its full force, when not loaded. The

* The clumsy and unscientific expedient of interposing slips of wood, or card, to prevent contact and sticking, is hardly deserving of notice.

keeper never adheres to the magnet; it is instantly repelled, and this rapid alternate movement is made to act on a fly wheel.

The annexed figure (II.) shows the manner in which the magnet A. and keeper B. are arranged. The keeper is a triangular prism, resting on two bits of brass projecting under the magnet. The movement is evident from the figure; the lower edge of the keeper never quits the magnet.

Both the magnet and keeper are electro-magnets; they are made to attract and repel by the same current without altering its direction. The mode of effecting this is as follows: The magnet and keeper communicate with the battery alternately, and the motion of the keeper causes the current to pass from the one to the other.

Let us suppose that the magnet being in communication with the battery, attracts the keeper till they come in contact. If, at this instant the current is suddenly shifted from the magnet to the keeper, the latter is repelled by the *residuum of magnetism remaining for a moment in the latter*, both having then like polarity. When the keeper is thus thrown off, on arriving at the desired distance (or angle) from the magnet, it causes the current to be thrown on the magnet again, and so on alternately. It is absolutely necessary that this movement should be instantaneous, and be performed with the utmost precision and accuracy; conditions, it will be seen, very easily fulfilled, by means of the apparatus represented in the annexed diagram, Fig. I.

Mercury is not used in any part of this arrangement. It would not answer the purpose of interrupting and restoring the communication with the battery, because that manœuvre requires a degree of precision the use of mercury does not admit of. The mercury soon becomes an amalgam of copper, and *drags a tail*, which alone is sufficient to interfere with the movement; and this is more especially the case when the engine is large, and the electrical current powerful.

Fig. I. represents the poles of a magnet with its keeper; both being electro-magnets. That from which this figure is taken is a bar of soft iron, two inches square, and weighs about 80lbs. The apparatus by which the movement is produced and regulated, is placed as represented in the drawing. A. B. is a board firmly wedged or screwed between the arms of the magnet. C. D. a copper bar, which moves on a pivot at P. To this bar a permanent communication is made with one side of the battery, say the zinc side. The *copper* side communicates with both the magnet 1, and keeper 2, by the copper strap O. To the nut at E., the strap intended to communicate with the zinc side is screwed, and to E. is in like manner attached the wire from the keeper intended to communicate also with the zinc side. The bar D. strikes alternately E. and F. as it is acted upon by the keeper; which it does as follows:

It will be observed that, one side of the magnet, and one side also of the keeper, are permanently connected with the copper side of the battery, by the copper strap O. Now, when the bar C. D. is made to touch E., the magnet receives the whole of the current from the battery; and when the same bar touches F., the current passes only through the keeper. Therefore, when the magnet is rendered magnetic, it attracts the keeper, which is then not magnetic; and when the current is instantaneously shifted to the keeper, it is suddenly repelled by the residuum remaining for a moment in the magnet, as already described.

The current is thus thrown alternately on the electro-magnet and keeper, and this is effected by the movement of the latter. It is absolutely necessary that the copper bar D. should remain in contact with E. during the movement of the keeper from its greatest distance, till it actually strikes the magnet. Let us suppose, that the copper bar D. is in contact with E.; the magnet will now attract the keeper, and when it arrives within, say the 20th of an inch of the magnet, it

strikes the end of the long brass screw M. (passing through C. D.) which throws the copper bar C. D. upon F.; thus shifting the current from the magnet to the keeper. The keeper is now repelled, and as it reaches the required distance or angle, regulated by the screw L, to which it is attached by the chain S., it necessarily throws the copper bar D. back against E., shifting the current again to the magnet which attracts the keeper as before; and in this manner the movement is continued. The keeper is attached to the screw L. by twine or a chain, so as that it may not move the copper bar C. D. till it arrives at the required angle or distance.

The movement of the bar C. D. between E. and F. may easily be regulated by the screw F. It need not exceed the 20th of an inch, or it may be less; all that is required being to break metallic contact. The screw M. can easily be adjusted so as to make the keeper, when it comes in contact with it, shift the bar C. D. from E. to F.; but this adjustment must be accurately made, to insure regularity in the movement. As the keeper does not shift the current from the magnet till it is within less than the 20th or 40th part of an inch from actual contact, we shall find that actual contact does always take place before the keeper is thrown off by the magnetism induced in it acting upon the residuum remaining for a moment in the magnet.

When the keeper is not attached to the fly wheel, it strikes the magnet with great force and noise; but there is no noise when it is loaded or has work to do. It may be made to strike 150 to 200 times in a minute; and never adheres to the magnet.

With regard to the action of the keeper upon the fly wheel, it will be seen by the annexed figure that it is performed by a contrivance different from a crank. The crank can hardly be applied with advantage where the impulse is repeated several times during one revolution of the wheel. The motion of the fly wheel is produced by repeated pulls upon the rim

of a small wheel fixed upon its axle. This is managed by means of the apparatus represented at Fig. III. A. is a steel toothed wheel fixed on the axle of the fly wheel, Fig. II. D. D. are brass cheeks moveable on the projecting sides of the steel wheel, and screwed together at F. C. is a double catch which freely allows the brass pieces D. D. to be thrown back, but when drawn forward by the keeper, catches the toothed wheel A., and thus causes the fly wheel to turn. E. is the pin to which the bar from the keeper is attached; it can be shifted further from, or nearer to the main axle, at pleasure. When the motion of the fly wheel is required to be reversed, the brass pieces D. D. are turned under the main axle, the catch being made to act in this position also, merely by pushing a spiral spring to the other side of it.

The action of the engine is instantly arrested by placing a thin slip of ivory between E. and C D., and as quickly restored by withdrawing it. It is unnecessary to say that no impulse is required to renew the action.

There being no change of poles in these magnets, I find that a certain degree of permanent power is induced in the large bar. This is no disadvantage; on the contrary, it helps to repel the keeper when the current is shifted to it.

As the working power of the magnet is greatest when nearest to the keeper, and as the strokes are also quicker in this position, nothing is apparently gained by allowing the latter to recede very far from the former. The manner in which the power is applied to the fly wheel renders it unnecessary, and in this respect the arrangement differs essentially from the crank. The adjustment of the bar R., where it is attached to the keeper and fly wheel, as shown in Fig. II., enables us to regulate the length of the stroke at pleasure.

The model from which this description is taken consists of two electro-magnets, side by side, as seen at Fig. IV. They each act independently on the axle of the fly wheel, as already described. Several may of course be so placed. I have placed

the bent end of the magnets next to the fly-wheel to enable me to work it by a longer rod, which more readily admits of reversing the motion by turning the apparatus at Fig. III. above or below the axle.

A very short rod would not readily admit of this. Of course a great deal more room would be occupied by placing the fly-wheel opposite to the poles of the magnet. Various modifications however of this, as well as of other parts of the arrangement, will readily suggest themselves. But the apparatus at A. B. Fig. I. with its copper bar, binding nuts, and screws, works in so satisfactory a manner, by the motion of the keeper, which it also regulates, that the principle will be found applicable, as I have found it, to a variety of modifications of that described.

It is impossible in this country to get apparatus of this description, finished with any thing even approaching the required degree of accuracy. The two electro-magnets described above, weigh about 80 lbs. each; yet so defective is their construction, that their lifting power is not one-quarter of what it ought to be, or what we find it in those made in England. The iron is common bar iron, and there is but one coil or strand of copper wire used, of about one-tenth of an inch diameter.

For these reasons, I omit all details of experiments made on the motive power of this arrangement. In fact, such details are unnecessary. All those conversant with the subject will readily be able to form a correct judgment of the principle on which the movement depends, and the means by which it is produced. It will easily be seen what proportion of the current from the battery or of the induced magnetism, is wasted by any peculiarity in the arrangement. As for the movement itself, it appears to be quite perfect.

With a view of obtaining a longer stroke, I have tried the magnets and keepers, one over the other, working as one magnet; but it did not appear that any advantage was ob-

tained by this arrangement. I have no doubt, that a single magnet, with the same quantity of iron as in both, would be much superior to the combination alluded to. With a bar of iron *one foot* square, the stroke would probably be sufficient to work on a crank, if such should be preferred to the contrivance described. But I think the latter will always be preferred for electro-magnetic engines, when the stroke is several times repeated for one revolution of the fly-wheel. I have tried a screw paddle worked by the axle, which appeared to answer remarkably well.

As the poles are never changed in this arrangement, permanent steel magnets answer very well, the galvanic current being passed only through the keeper. It is a matter of economy and convenience. But it is probable, that as electro-magnets are much more powerful, they will always be preferred.

The galvanic arrangement employed, is the constant battery of Daniel. The zinc plates (10 inches by 5) are placed in thin leather cases, which are disposed as usual between plates of copper. All the zincs, and all the copper plates are connected together so as to produce the effect of one pair.

From Dr. Wight's Nilgherry Plants.

I.—RANUNCULACEÆ.

This is an extensive and beautiful family of plants, many of which, such as the Clematis, Ranunculus, Anemone and Larkspur, rank among the most admired favourites of the flower garden and arbour. Its species abound in extra-tropical countries, but are of such rare occurrence within the Tropics that, so far as I yet know, there are not above 12 or 14 found, truly indigenous, in the whole of the Indian peninsula, the flora of which amounts to probably not fewer than 5,000 species of flowering plants, of all descriptions, or it stands in the ratio of about 1 to every 400 species found

within the same limits. The paucity of Ranunculacious plants, within the Tropics, may be further shown by comparing them with the Flora of the whole world: thus, assuming that there are 600 species of Ranunculaceæ, and that there are 80,000 species of flowering Plants, they then stand in proportion of one to every 133 species.

According to published lists, the Indian peninsula, within an elevation of 500 feet above the sea, can only claim one species *(Naravelia Zeylanica)* and that of rare occurrence within these limits. This plant, which abounds at the foot of the Hills, is an extensively climbing shrub, so nearly allied to *Clematis* as almost to require a Botanist to distinguish them. Such being the case, it naturally follows that the next in succession should be a *Clematis*, and such in fact is the case, *Clematis Gouriana* (Nos. 1 and 2) being frequent on the table-land of Mysore and also on the eastern slopes of the Neilgherries, at an elevation of between two and three thousand feet. None of the other species found on these Hills, except perhaps *C. Munronii*, which I found in the jungles below Sispara, descend much below six thousand feet of actual elevation, though all occur within a few hundred feet above that limit.

Continuing our ascent of the Neilgherries, the next species that presents itself is the *Clematis Wightiana* (No. 3) which abounds in the thickets about Kaity, and along the road from thence to Ootacamund. The *Anemone Wightiana*, begins to show itself occasionally about Coonoor, but is no where frequent until we have nearly attained the level of Ootacamund, where in the pastures, especially on moist ground, it becomes most abundant, but still ascends to the highest range of the Hills. The species of *Ranunculus* are of rarer occurrence, two species being generally met with in clumps of jungle, and the third (*Ranunculus reniformis,*) is sparingly scattered over the higher pastures on the more elevated hills, and in such situations, is well calculated to remind the European sojour-

ner of the Butter Cups which so charmingly variegate the Hill-side pastures of our Father Land. It is also met with in swampy grounds about Ootacamund.

The number of truly native species on the hills, so far as yet found, amounts only to nine or perhaps ten. Thirteen are described in our Prodromus, but three of these I have since satisfied myself are introduced, namely the *Adonis* (Pheasant's eye) and two species of *Delphinuim* (Larkspur.) The remaining plant, excluded from the present list, is *Anemone dubia*, which I have ascertained to be a mere variety of *A. Wightiana*. These nine are referable to five genera, namely, *Clematis* 3, *Naravelia* 1, *Thalictrum* 1, *Anemone* 1, and *Ranunculus* 3. In still further proof of the extra-tropical character of this family I may mention, that Dr. Royle enumerates in his Illustrations of the Himalayan Flora, no fewer than 72 species of *Ranunculaceæ* found on the Himalayas and in Cashmere.

CLEMATIS. *Linn* : *(Travellers' Joy—Virgin Bower)*

Involucre none or resembling a calyx, and placed under the flower. Sepals 4-8, coloured, in æstivation either valvate or with their edges bent inwards. Petals none, or shorter than the sepals. Stamens numerous. Achenia several in each flower, terminated by a long tail. Seed erect.—Perennial plants with opposite leaves, which are simple, trifoliate, or once or twice pinnate, with a terminal leaflet.

This is a fine genus of beautiful climbing plants,—all the species of which seem well adapted for arbours,—and in Europe are much employed for the formation of these retreats, (hence I presume the old English names) as well on account of their rich foliage as for the profusion of their flowers, a feature long preserved by the beautiful silky hairs of the long feathery tail of their seed, (a rude idea of which I have attempted to convey in Plate No. 2), a mark which readily distinguishes this section from the rest of the family. The genus *Clematis* includes about 150 species which are scattered all over the world. The flowers are apetalous with petaloid sepals. Naravelia differs in having both Calyx and Corolla.

1. 2. CLEMATIS GOURIANA, *(Roxb.)* climbing: leaves pinnate or bipinnate; leaflets ovate-lanceolate, acuminated, cordate at the base, 3-or obscurely 5-nerved, entire or with a few coarse serratures: young branches angled, and peduncles, and oblong achenia pubescent: sepals revolute.—*W. and A. Prod. p.* 2.

This beautiful species flowers during the cool season. At this time, January, it is in full bloom in the jungles below Coonoor, where it may be seen climbing to the tops of the highest trees completely covering them with such a profusion of white flowers as almost to conceal the tree that supports them. In Mysore it is of frequent occurrence in the dense thickets surrounding most of the hamlets of that province.

3. CLEMATIS WIGHTIANA, *(Wall.)* climbing: leaves pinnate; leaflets not wrinkled, very villous and soft on both sides, coarsely serrated, cordate at the base, palmately 3-lobed, the middle lobe the longest, or divided again into 3 ovate-lanceolate segments: young branches, peduncles, and flat achenia, pubescent: sepals ovate, outside very pubescent, inside glabrous: filaments hairy. —*W. and A. Prod. p.* 2.

This species is less frequent than the preceding, but is abundant among the brushwood of clumps of jungle about Ootacamund; also on the road side above Kaity, and on that leading from Southdown round the foot of Elk Hill. In the latter station I met with it in the greatest perfection. It is readily distinguished by its soft almost woolly pale green leaves.

I may here remark that the colourist has represented them of too deep a green, for which, however, I can scarcely blame him, as I found it very difficult to obtain the proper tint.

ANEMONE. *Wind Flower.*

Involucre 3-leaved, distant from the flower, the leaflets variously cut. Sepals 5-15, petaloid, imbricated in æstivation. Petals 0. Stamens numerous. Achenia numerous. Seed pendulous. Herbaceous plants with a perennial root. Leaves radical, stalked, more or less cut or lobed. Scape, when branched, bearing involucres at each of its divisions.

Of this genus nearly 100 species have been described in recent Botanical works. They are for the most part herbacious with perennial roots, and, generally, can be at once distinguished by their flowers having no distinct calyx, the floral leaves being all petaloid:

hence it is called a petaloid calyx. By this mark as well as by habit, or general appearance, they are readily distinguished from their next neighbour in the Botanical system, Ranunculus, which has a regularly formed calyx and corolla.

Some of them are much cultivated in gardens, and under the operation of skilful horticulture have become so completely doubled, that all the stamens and pistils have been changed into petals. In this state, however monstrous in the estimation of botanists, they are certainly most beautiful objects and deservedly great favourites in the eyes of the florist: many of them, especially the *Anemone coronaria*, when in that state, being variegated with the richest tints. Under such a course of treatment it appears to me, the one here figured might be made to undergo that change, and become one of the most choice garden flowers to be met with on its native mountains. This change might probably be brought about by transferring roots to the rich soil of the garden, and preventing them flowering for a season or two, by the simple operation of stopping, a practice which has the effect of strengthening the root. At the end of the season when the leaves wither, they should be taken up and kept for a few weeks in a dark place, and again planted. As the roots are perennial, this practice would probably in a few seasons effect the desired change, after which they can be propagated by dividing the root. For obtaining new varieties, plants are raised from seed, taken either from single or partially double flowers, and treated as above, taking up the roots when the leaves wither.

4. ANEMONE WIGHTIANA, *(Wall.)* clothed with silky hairs; leaves on very long petioles, tripartite; divisions very deeply 3-cleft; segments cuneate, deeply 3-lobed; lobes cuneate, irregularly inciso-serrated: involucral leaves subsessile, deeply 3-cleft; divisions 3-cleft; segments linear-oblong, cut and serrated; sepals 6-8, elliptic-oblong: achenia glabrous: style hooked, persistent. —*W. and A. Prod. p.* 3.

Frequent in pastures about Ootacamund, but also generally distributed over the hills. Flowering in May and June. Flowers white within purple exteriorly. During these months it is certainly one of the greatest ornaments of the hills. I have not heard of its being applied to any useful purpose, though it may not be destitute of useful qualities as some of them are known to possess these.

RANUNCULUS. *Butter-Cup. Crow-foot.*

Sepals 5, not free at the base, deciduous, imbricated in æstivation. Petals 5, rarely 10 or more, the claw furnished inside with a nectariferous concave little scale. Stamens and styles numerous. Achenia ovate, pointed, somewhat compressed. Seed erect—Herbaceous plants with annual or perennial roots. Leaves mostly radical; cauline ones placed at the base of the branches and peduncles.

This genus ranks very near the former in the Botanical system, agreeing with it in its herbaceous character, its perennial roots, the form of its flowers, and structure of its seed, but differs in having a perfect calyx and corolla, in place of a petaloid or corolla-like calyx, and the seed erect, not suspended in their cells as in Anemone. Like *Anemones* these plants frequent pastures, shady woods, and moist soils near water, and they equally, but more energetically, participate in the acrid properties of the family. Like them, under proper cultivation they become double, and in that state are equally prized as garden ornaments. Of those found on these Hills only one, *Ranunculus reniformis*, seems well adapted for the garden. It grows in open pastures, has thick fleshy roots, is naturally furnished with numerous petals, about 12, and, probably, treated as above, would soon shew a tendency to increase the number.

The *Ranunculus* when thoroughly doubled is a fine flower, especially when richly variegated. Formerly they were in much greater repute as garden ornaments than in the present day, when gardens are stocked with such a multiplicity of new flowers brought from all parts of the world; but I almost doubt whether the lovers of fine flowers have not sustained a loss in discarding them to so great an extent as they have done from the Flower border: and I should not be surprised, ere long, to see them again taken into favour when the fashion for the large and gaudy Dahlia and such like has somewhat abated, and that far more modest, but not less beautiful object, has resumed its place among the admirers of really fine flowers. Of this I, at all events, feel quite certain, that I have never on the Neilgherries seen a Dahlia that would bear comparison with Ranunculuses and Anemones I have seen in even second-rate Cottager's gardens in England.

5. RANUNCULUS WALLICHIANUS, *(W. and A.)* erect, hairy: radical leaves roundish ovate, rounded or somewhat cordate at the base, coarsely crenated; lowest scape-leaf oblong, toothed, narrowed at the base into a petiole; upper ones nearly linear: petals (yellow) numerous, 10-13, twice as long as the patulous calyx: heads of fruit globose: achenia oblong, tumid, minutely dotted: style nearly straight.—*W. and A. Prod. p.* 4.

This species is generally met with in moist woods, is of a procumbent habit, with small flowers, flowering in May and June after the rains of the South-west monsoon have commenced. It is however found at other seasons, especially during rainy weather. Another species is found at the same season, and so much resembling this one, that, to the unpractised eye, it is not distinguishable, but is at once known by the seed, which, in this, is furnished with numerous little tubercles, in that, is quite smooth and without asperities of any kind.

II. MAGNOLIACEÆ.—*Champ, Champac.—Champany.*

The species of this family are for the most part large trees or shrubs, forming a remarkable contrast with those of the preceding family, and on this account apparently most unnaturally grouped almost side by side with it. And yet the ablest Botanists who have given their attention to the grouping of natural families, so as to form a series in which those most nearly associated by the structure of their flowers and fruit should stand nearest each other, have hitherto failed in discovering for it a more suitable place in the vegetable system, a fact not to be much wondered at, as in the structure of their flowers and fruit, the two families so nearly associate that, but for other circumstances, Magnolias might almost be looked upon as gigantic Arboreous Ranunculuses.

The bulk of this family are natives of North America, a few only being found in Asia, and none, so far as is yet known, in Europe or Africa. Several are found in China and

Japan, a few in the Himalayah range, three or four in Ceylon, and two or three on the mountains of the Indian peninsula. Generally they are distinguished by the fragrance of their flowers, which has led to the introduction and extended diffusion over India, of the Champac as a sacred tree, the flowers of which, when procurable, are offered by the natives at the shrines of their idols.

The tree here represented is the only one found on the Neilgherries, and there attains the size of a large timber tree, the wood of which however is only used in house building. Owing to its hygrometric properties it is not adapted for other purposes, as it swells and contracts, according to the moisture or dryness of the atmosphere, to an unusual extent, even after long seasoning. When formerly writing on this family in my Illustrations of India Botany, I considered this distinct from the plant there figured under the name of *M. Palmyensis*, better acquaintance with this one, has led me to doubt the correctness of the opinion there expressed, which was mainly formed on what I now find an incorrect figure and description.

MICHELIA. *Linn.*

Carpels arranged in a loose spike, of a consistence between leathery and fleshy, 2-valved, opening from the apex downwards. Seeds several (3-8), externally fleshy.—Leaves entire, petioled. Flowers axillary, generally fragrant, usually of a yellow colour.—*W. and A. Prod. p. 6, No. 1.*

This genus which is the only one of the family found so far south in India, consists of large trees or considerable shrubs, and may I believe generally be met with, where abundant, in flower nearly the whole year; but on the Hills are in greatest profusion during the rainy season. The flowers are usually rather large, frequently with a tinge of yellow, very fragrant. Those of the Neilgherry species are nearly white.

M. NILAGIRÆA, *(Zenker.)* Leaves elliptic oblong, tapering to a point at both ends, glabrous; stipules and spathes silky petals from 9 in three rows, stamens numerous shorter than the column of fructification, ovaries numerous about 4 ovules in each: carpels warty, one or two seeded.

A large tree found frequently in the clumps of jungle about Ootacamund. There are several very fine ones in the thicket immediately adjoining the Church, the branches of one or two of them overhanging the road.

III. MENISPERMACEÆ.

This curious family consists, with few exceptions, of twining shrubs, and is nearly confined to Asia and America, a few have been found in other tropical countries. One is found above 3,000 feet of elevation on the Himalayas, and one in Siberia These I believe are about the only exceptions to its tropical character, doubtless others are found beyond the tropics, but still in warm latitudes where frost is scarcely known. The one here represented has the widest range of elevation of any I have met with in the Peninsula, extending from the plains to Ootacamund, where it is found in almost every thicket. One other species I have found on the Hills and only there, but so rare that I have only once seen it, and then not in good flower, otherwise it would have been a more appropriate representative of the family for this work.

The order is in many respects peculiar, and seems hitherto to have nearly set at defiance all attempts of Botanists to find a suitable location for it in the natural arrangement of the vegetable kingdom. I here retain it in the situation allotted by the late most accomplished Botanist, Prof. DeCandolle, though satisfied in my own mind it is not well chosen, from feeling convinced that premature and partial reforms are productive of greater injury to science, than the errors they are intended to remedy.

Intense bitterness, more or less combined with narcotism, is the prominent quality of the order, as evinced by the well

known Columbo root, and the notorious Cocculus Indicus, in which the bitter principle of the family is combined with a less innocent narcotic property, which it is said London Brewers impart to their porter.

CLYPEA.

Dicœcious. Calyx of 6 sepals in a double series, with 3-6 close pressed bracteoles. Corolla none. MALE. Stamens united into a central column, dilated at the apex, bearing several 2-celled anthers; cells opening horizontally, placed end to end, and forming a ring round the top of the column. FEM. Ovary solitary. Stigmata 3 (or rarely 6 ?) Drupe obliquely reniform; nut compressed, wrinkled round the margin. Seed solitary, uncinate. Albumen fleshy. Embryo tetete, of the same shape, and about as long as the seed.—Twining shrubs. Leaves peltate. Panicles axillary, both male and female without cordate bracteas.—*W. and A. Prod. p.* 14, *No.* II.

This genus is one of four or five appertaining to this family found in the Indian Peninsula, and is easily distinguished from its congeners by its male flowers, the stamens of which are united into a single column forming at top a large capetate anther which opens round the upper margin for the transmission of the pollen. The flowers of this like those of the preceding order belong to the ternary form, that is, are composed of one or more whorls, each having three leaves. In this instance three such are shown in the diagram, fig. 8, while the centre ring may be supposed to consist of either one or two such verticles. In Cocculus there are two whorls of stamens, each having a scale at the base; in this there are only three scales (fig. 3) surrounding the column, hence it seems probable that one whorl only unites to form the compound stamen.

CLYPEA *hernandifolia*. (W. & A.:)—Leaves ovate, rounded or scarcely truncate at the base, mucronulate, upper side glabrous, under slightly hairy: panicles about equal to the petioles, umbelliform; rays umbelliferous; pedicels very short: polliniferous ring 6-celled.—*W. and A. Prod. p.* 14.

Frequent twining among underwood, in the clumps of jungle about Ootacamund particularly in low moist situations—It is equally frequent in similar situations on the Pulney mountains, but also occurs on the plains in moist shady jungles.

IV. BERBERIDEÆ.—*Barberry.*

This is a small family of finely flowering shrubs, natives of the temperate regions of both the Northern and Southern hemispheres. In the Indian Peninsula two species certainly occur, a third is said to be found in the Coorg jungles, but on that point there still seems room for doubt. Both are found on the Neilgherries, the one here represented being by far the handsomer of the two. Other nine genera are referred to the order, but this is the only one found in Southern India. The peculiar distinguishing mark by which this family is separated from the rest of the vegetable kingdom is the curious anthers, which open like the lid of a snuff-box to give exit to the pollen, combined with a very perfect flower. The cinnamon tribe (*Laurinæ*) have similar anthers, but very incomplete flowers in comparison with those of *Berberideæ*, and are in consequence far removed from them in our linear series of natural orders, but, notwithstanding, they have many points in common, showing a closer relationship than might at first sight be suspected—among these are the ternary arrangement of the flowers, the valved anthers, and single superior ovary.

The filaments of some, if not all the species of this genus are endowed with a peculiar irritability, which causes them when touched at a certain point near the base, to contract elastically and strike the anther against the style, and in that way scatter their pollen on the stigma. This property exists in both the Neilgherry plants. The properties of the wood are mildly astringent and bitter, and in the Upper Provinces an extract is prepared by boiling the wood, which is highly esteemed by the natives on account of its medicinal qualities. In Upper Bengal the fruits of two species are dried like raisins in the sun, and sold as kistmisses in the bazars all over the country.

BERBERIS.—*Barberry.*

Sepals 3-4-6, deciduous, in a double row, accompanied externally with petaloid scales. Petals hypogynous, equal to the sepals in number and opposite to them, or twice as many; often furnished in

the inside with an appendage at the base. Stamens hypogynous, equal in number to the petals and opposite to them: anthers bilocular, the cells opening elastically with a valve from the bottom to the top. Ovarium solitary, unilocular, containing 2-12 ovules, which are erect, or attached laterally to the inner margin, and forming there one or two rows: style sometimes lateral, short: stigma orbicular. Fruit baccate or capsular, indehiscent. Albumen fleshy or horny. Embryo straight, in the axis of the albumen: radicle pointing to the hilum: cotyledons flat.—Leaves alternate, without stipules.—*W. and A. Prod. p.* 15, *No.* I.

The species of this genus, amounting to about 50, are nearly all shrubs, or at most small trees armed either on their stems or leaves with numerous thorns. In those with thorny stems the thorns are considered a modified state of the leaves in which the parenchema or dilated portion is displaced, and the ribs or veins have become indurated. Some Botanists propose dividing it, removing the plant here figured along with some others to form the genus *Máhonia*, which however only differs in the petals wanting two glands at the base, which the others have, a character considered altogether insufficient for the purpose. On this account the older name is here preserved. All the plants of this section of the genus are very handsome shrubs. The one figured is common on the hills, and when growing in favourable situations attains the size of a small tree. A pale yellow dye is extracted from the wood of both the Hill species, a third species belonging to the Mahonia division, with drooping racemes of flowers, is, I am told, found in Coorg, and which I think I once saw on the Pulney Mountains, but not then in flower. The Pulney plant differs in habit from this in having diffuse rambling branches.

Berberis (Mahonia) Leschenaultii (*Wall.*)—Leaves pinnate; leaflets about six pair, ovate, nearly equal in size, slightly cordate at the base, repand with 6-8 thorny teeth at each side, about 5-nerved at the base; lower pair of leaflets close to the

As this is a true congener of Nuttal's genus *Mahonia*, I preserve that as a subgeneric or sectional name. The plant is found in almost every clump of jungle about Ootacamund, flowering during the South-west monsoon, but may generally be met with in

stem: racemes elongated, slender; bracteoles at the base of the pedicel oblong, obtuse: petals with two distinct glands; filaments without teeth: berry globose, crowned with the evident style and stigma.—*W. and A. Prod. p.* 16.

flower at other seasons, though more rarely, the fruit ripens during the dry season, and when fully ripe acquires a bluish purple colour.

V.—CRUCIFERÆ.—*Cabbage Tribe.*

This large and most useful family of plants, supplies man with many of his most esteemed esculents, among which may be named the whole tribe of cabbages, turnips, rape, mustard, cress, scury grass, radish, horse radish, &c., and to the flower garden, wall flowers, stocks, candy tuft, honesty, and many others. But though it thus abounds in both useful and ornamental plants in the temperate regions of the globe, it scarcely merits a place in this work, 3 or 4 insignificant species being all that are found here which the one figured is the best looking of the set. Such being the case, it seems useless to dilate on a family that can possess so little interest for the lovers of the wild flowers of our Blue-mountains. Though thus rare, even in the temperate climate, the family is a large one, including little short of 1,500 species. A few however are found in warmer climates, the most curious and interesting of which is the so-called *Rose of Jericho* (*Anastatica*, literally resurrection flower) a native of the sandy deserts of Arabia, the ends of the branches of which contract during dry weather, and form a ball which may be taken up and kept in that state for years; and at the end of that time, if the roots are immersed in water will re-expand, the flowers open, and in a few hours the whole plant appear as if it had never been out of the ground.

The family derives its name from the Latin word *Crux cruc*is, a cross, with reference to the four petals spreading in opposite directions, so as to form the appearance of a St.

Andrew's cross, and by this mark they may always be known at a glance. They have besides six stamens, four long and two short, whence Linnæus derived his name Tetradenamea, that is, four powers, in allusion to the four long stamens.

CARDAMINE.—*Ladies' Smock.*

Calyx connivent or somewhat patent, equal at the base. Petals with a claw; limb entire. Stamens distant, without teeth. Siliqua sessile, linear, elongated, compressed; valves flat, nerveless, somewhat smaller than the incrassated replum,* from which they usually separate elastically. Style short, or none: stigma nearly simple. Seeds ovate, without a border, forming a single series: podosperms slender. Radicle applied to the edge of the cotyledons (o=).—Leaves petioled entire, lobed, or variously divided, often different on the same individual. Flowers white or rose-coloured.—*W. and A. Prod. p.* 19.

The species of this genus are very numerous, and where they abound, very ornamental; as, for example, the *C. pratinses* of English meadows, which, in spring, appear in such numbers as to whiten the fields where they grow, so as to give the appearance of bleaching greens; whence, it is supposed, it derived its English name of "Ladies's Smock." The one here figured does not possess that recommendation, as it usually occurs but thinly scattered in woods, and may generally be found in flower during wet weather at all seasons.

Cardamina Babbonice (Persoon).—Leaves trifoliolate; leaflets, hairy on both sides, particularly on the nerves beneath, sipetioled, ovate acuminated unequal at the base, irregularly and sharply toothed, terminal one sometimes 3-lobed or divided into 3 leaflets similar to the others: siliqua erect.—*W. & A. Prod. p.* 20.

VI.—FLACOURTIANEÆ.

This is a small family of trees and shrubs, but on the limits of which considerable difference of opinion exists among Botanists, a subject on which much might be said were this the place for such disquisitions. Suffice it therefore to say, that there are two nearly related families (Bixaceæ and Fla-

* *Replum* is the frame surrounding the dissepiment, from which the valves fall off, and to which the placentæ are attached.

courtianeæ) which many Botanists consider quite distinct, but which others combine to form one large one. The preponderance of opinion is on the side of those who keep them distinct, but they, on the other hand, differ among themselves as to the genera that should be respectively referred to each, a fact which seems to indicate a degree of affinity quite consistent with their union and re-division into sub-orders, the course which Professor Endlicher has adopted in his Genera Plantarum. Mr. Bennett (Plantæ Javanicæ Rarioris) has in a long and very elaborate article, under *Phoboros rhinanthera*, undertaken to throw more light on the subject, and to reconcile the differences existing among Botanical writers on these two families: but after a copious adduction of evidence on all sides, has forgot to sum up, and, consequently, has left the question involved in about as great darkness as when he commenced. I learn however from a careful perusal of that article—1st, That Mr. Brown coincides with Dr. Blume in considering the genus *Hydnocarpus* as forming the type of a new order, to which the latter Botanist has given the name *Pangiaceæ*, derived from *Pangium* an old generic name of Rumphius.—2nd, That he agrees in opinion with those Botanists who think the two families ought to be combined, a view in which I can scarcely coincide, on his own showing, as he states the ovary of Flacourtia has several cells, with central ovules, while those of all the other genera have one-celled ovaries and parietal ovules, as in the accompanying figure. For this reason I conceive the order *Flacourtianeæ* should be retained, even though limited to the single genus *Flacourtia*. But supposing this difficulty got over by finding the partitions more or less inconstant, I cannot help thinking the association of numerous plants having dry dehiscing capsules with others equally numerous having indehiscent baccate fruit, one that ought, when possible, to be avoided.

Mineralogy of Southern India. By Captain J. CAMPBELL, *21st Regiment, M. N. I.*

I fear that the subject of petrology in India will hardly be considered an interesting one, except to the man of professed scientific attainment, or to the tyro who may be seeking information. To the first, the publication of the crude remarks of my note-book will afford an opportunity of identifying the various rocks, which I have met with in Southern India; while to the latter, the various notes and extracts from the published works of authors, will serve as an index to books, where he can procure more complete information, and where the subject can be fully studied. I shall not attempt to classify the rocks, but give the names in the irregular order as I find them entered; as any more perfect attempt at arrangement, would lead to a consideration of the principles of the science of "Descriptive Petrology," a subject on which I purpose hereafter to hazard some remarks, after the manner of Dr. Macculloch's work on "Rocks."

Black Diallage.

This beautiful rock is well known in Southern India as forming the famed pillars of Sultan Tippoo's tomb at Seringapatam. Buchanan Hamilton first called it Hornblende Rock, to which it bears some resemblance, and the error which he committed has been copied by a number of careless observers, who could not plead the want of leisure, and the pressure of business of collection, which is a sufficient excuse for Buchanan's mistake; and some hasty and prejudiced men have got in a rage at their blunders having been pointed out. The remarks of both Capt. Newbold, 23rd Regt. M. N. I. and myself, shewing that it was not Hornblende Rock, appeared simultaneously in the Madras Journal of Science; but I believe priority is properly due to Capt. Newbold, who visited the locality before me, though I was not aware at the time of my visit that he had been there.

The characters of the rock are as follow. Colour: bluish, lead coloured black; with the polished surface jet black nearly, shewing very little of the speckled appearance of black granite, except where the surface is wetted. Fracture: irregular and granular, shewing to the lens some minutely lined tabular crystals of Hornblende, and small pearly coloured splintery crystals of felspar. Structure: much the same as black granite, aggregated, of confused imperfectly fibrous and radiating crystals of a lead colour, mixed with similar crystals of pearly felspar. Structure: something resembling that of actinolite: Streak whitish. Infusible by the most intense heat, a few minute specks only intermixing slightly, but becomes whitened: is more brittle than black granite.

In looking at the pillars of Sultan Tippoo's tomb, I suspected at once that they were not made of black granite, from the absence of the speckled appearance. On enquiry I found that no one could point out the quarries from which the stone had been brought; but I received credible information, that the Sultan was very fond of it in architecture, and that a considerable quantity had been brought at various times. I therefore went off, hammer in hand, to examine the Sultan's old palace, long since used as the gun-carriage manufactory, where the fine moulded bases under the wooden pillars of the Durbar attracted my attention; and on cleaning one, with a coarse cloth and water, from the dirt and whitewash which coated it, I found it to be formed of the identical stone of the famous pillars. My hammer therefore speedily procured me a specimen, and from the ease and readiness with which it snapped off, I was at once convinced of the correctness of my former guess. I have not been able to identify this rock with any similar one described by authors as having been found in Europe, and Macculloch's definitions are not very precise. Serpentine by Macculloch is not classed as forming a compound rock of any

kind; and as this rock is decidedly compound, I have preferred considering it as a compound of Diallage; because Macculloch ("Rocks," page 648) says, that Diallage occurs in Shetland of a black colour, and forms a compound rock with felspar, of a brown colour. As Macculloch most likely never saw the Diallage rock of Shetland polished, it is very probable that there is little difference in the colour of the fracture, which he calls dark grey and brown, and I have called bluish, lead colour black, so as to maintain some ideal resemblance to the colour of the fracture of black granite. To prove the composition of a compound rock is a difficult matter, unless it can be freely examined in sites: this I had no opportunity of doing; but Capt. Newbold visited Tauvicairy, where the stone is said to have been quarried. I have not his remarks at hand to refer to; but from some specimens sent me by Dr. Cole of Madras, I may be allowed to doubt, if he saw the real rock; as those specimens, though very small, seemed to be a variety more like Serpentine, and certainly much more Magnesian than the black Diallage. Chemical analysis also of a compound rock is not a certain guide; but as it affords considerable assistance I publish the following quantitative analysis, though with some diffidence, as the analysis of a Magnesian rock is not an easy job, while our means in India are very imperfect, and I have not yet had leisure to make a good one. The rock, powdered, was a "grey white" colour. The analysis, heated red-hot, lost 3-40 per cent. of weight; but ignited for fifteen minutes more, lost 4-73 per cent. It had been found that caustic potash did not decompose the analysis readily, therefore mixed with carbonate of soda, and ignited; dissolved in muriatic acid, evaporated to dryness, &c., acidulated, and water added, and filtered to separate the silica. The filtered solution was precipitated by excess of ammonia, and allowed to stand a night to separate manganese: it was then filtered, and evaporated to near dryness, diluted again with water and

decomposed by carbonate of potash, according to Dr. Thomson's method, to separate the magnesia; but this was not satisfactorily done. The magnesia after weighing was superacidulated with sulphuric acid, and then dissolved in water; a few flocks remained, either lime or some lead, from the acid not being quite pure. The precipitate of ammonia was boiled with caustic potash to take of alumina, which was again separated after filtering, by muriate of ammonia. The ferruginous residue left on the filter was re-dissolved in muriatic acid, and precipitated afresh by ammonia, and an attempt was made to suspend manganese by an excess of muriate of ammonia, but it was not proved satisfactorily that the analysis contained manganese. The iron was considered to be in the state of protoxide. Several analyses were made, but they were all imperfect in one point or other, and an attempt to separate manganese by benzoic acid also failed: however, the subjoined proportions may be considered as a tolerable approximation:—

Silica, ...	48.93
Magnesia, ...	29.31
Protoxide of iron, ...	9.23
Alumina, ...	6.29
Water, ...	4.73 and volatile matter

As the analysis was infusible, it is not probable that it contained an alkali, and the loss is within the limits of a quantitative analysis.

Salem yellow Wood-stone.

This is a very beautiful mineral, and I believe quite new in petrology, for I have been unable to find any notice by authors of a similar one. I think the name is quite as good as any coined one, and the only objection may be in the use of the word 'wood-stone,' as it has no resemblance to the mineral generally so called. In my earlier notes I find it called 'Salem yellow woody mineral.' I have not seen it in sites, but

found my specimen, a piece of about 18 inches long, and exactly like a piece of a branch of a tree, in a nullah in the Salem magnesia formation. I think Mr. Fisher of Salem told me he had seen it in sites in Mr. Heath's chromate of iron mines. The outer surface of the specimen was water-worn in the nullah, and the smooth surface thus produced and the brownish tint it had acquired, made the resemblance to a bit of old wood almost perfect, and in consequence I told the lascar with me to split it. Its characters are,—Specific gravity: light, not much heavier than water. Colour: a buff yellow. Structure: continued fibrous-like wood, not thready like amianthus, but rather box-wood, breaking short off. Hardness: can be scraped smooth with the knife, like hard chalk; and the scraped surface smooth. Contains extraneous matter (ferruginous?) between the fibres, in parts. Adheres strongly to the tongue, like a bit of new tobacco pipe; hygrometric power great. It is associated with statactitia iron ore (vide), the reedy marks, in the sides of which seem to be caused by the fibrous structure of this mineral, and suggest the idea of its having been squeezed in a pasty state through fissures. The best analysis, which I have had leisure to make, is subject to the same objections as before; but I give it for want of a better. A portion of the mineral picked as free from iron as possible, scraped down with a knife, triturated in an agate mortar, was tough and cohered like chalk. It was fluxed in a silver crucible with caustic potash, as carbonate of soda had very little effect on it. In boiling the muriatic solution, a precipitate of white flocks appeared, which again disappeared when the solution became concentrated, but did not again re-appear after diluting and again boiling. This gave rise to the idea, that the mineral contained titanium, but in a fresh analysis the precipitate on boiling did not appear. In two analyses the characteristic blue colour of copper appeared in the ammoniacal solution, from which the iron and alumina were precipitated; but it

was doubted if the copper had not been taken up from the silver crucible, which might not be quite pure. The analysis contained no lime. The following is a tolerable approximation to the composition:—

Silica, ...	40.11	(and Titanic acid?)
Magnesia, ...	39.15	
Iron, (peroxide,)	6.84	
Alumina, ...	0.53	
Copper, (oxide,)	0.50?	
Water, ...	13.50	volatilized by heat.
	100.63	

The iron was supposed to be in the state of peroxide, as yellow ochres, &c. are thus coloured. No reliance can of course be placed on the quantity of water, as the mineral was hygrometric, but the other numbers have been computed from the weight of the ignited analysis.

Naggery black Pot-stone.

This is another magnesian mineral, from the Naggery hills, north-west of Madras, given to me by Mr. Fisher of Salem. It is cut into snuff-boxes, &c. by the natives of the place. I have no account of its geological associations. Characters are—Colour: lead coloured black, much the same as black granite: Structure, imperfectly granular, and homogeneous: fracture, imperfectly conchoidal; imperfectly granular to lens: appears a little speckled. Lustre magnesian, and bluish. Streaks bluish white. Smell: sulphurous. Spec. grav. much less than black granite. Tough, and with difficulty broken: hardness but little more than steatite, or pot-stone: feels rough, but perceptibly greasy. I do not find that I have attempted to analyse it.

Binary Granite.

A granular aggregation of white quartz, and resplendent or glistening felspar. The crystals of each mineral being each perfectly formed, and totally distinct, so as to be easily

recognised by a lens; yet cohering after the peculiar manner of granite rocks. Is a graduation from the prevailing Hornblendic granite of Southern India, and is generally found associated with micaceous varieties. Is found near Ryacottah, and is so tough as to require blasting to separate the blocks. Has a perfect cuboidal cleavage, and if polished would form a very beautiful building stone.

Pegmatite.

A binary compound of crystalline quartz and felspar, more or less saccharine. It differs from binary granite in the felspar, not forming resplendent crystals, but having an arenaceous or an earthy appearance. It forms extensive beds in the schistose series of rocks of Southern India, but has no regular cleavage, and is generally so loose in aggregation as to break readily to pieces, and sometimes crumbles down, so as to be used as a road-making material. The term Pegmatite was first used by the French geologists, as applied to binary granite; but, as Dr. Benza has used the term in the same sense as I have now defined it, I have therefore preserved it. Dr. Boase, (Primary Geology, page 203,) uses the term as synonymous with graphic granite, and classes it with the schists of Cornwall, with which he says it graduates. Dr. Macculloch (Rocks, page 340) describes it as a variety of "red primary sandstone," but his theoretic distinction I do not allow to be correct, unless people choose to consider my "schistose series" as being of derivative origin; but in itself or its associations, the structure of the rock is totally different from the "coherence" of the composing materials of the secondary sandstones. In Southern India, it seldom is found without some slight admixture of Mica or Hornblende.

Eurite.

This is a French term, and applied to the Weiss-stein or white-stone of Werner. It was first used in Indian petrology by Dr. Benza, but he has not been very precise in his application of the term: and though I have visited much of

the localities described by him, I am unable to define the rock to which he intended to apply it, as he seems to have used it for pegmatite when it was very white, and for binary granite when it was too far distant for him to perceive the crystalline structure of the felspar. Dr. Boase (Primary Geology, page 203,) defines the difference between pegmatite and eurite to "be according to the size of the grains; the former being large and crystalline, the latter, small and intimately blended or actually combined."

Graphic Granite.

This rock is rather rare: it occasionally occurs among the porphyritic series. It is a variety of granular quartz porphyry, being composed of contorted lamina of quartz embedded in a granular paste of felspar, or in compact felspar. The lamina of quartz are contorted into fantastic shapes, something like the characters of the Nagaree dialect. Dr. Macculloch's definition also applies well to the Indian rock. "The quartz and felspar, which compose it, are aggregated in lengthened parallel prisms. The prismatic structure therefore is seen in one direction; while, in the reverse, the peculiar appearance, whence the term is derived, becomes visible. That appearance is produced by the cross section of the quartz prisms. These are frequently triangular, occasionally hexagonal and flattened; and in a few rare instances, the two minerals form alternating laminæ."

Saccharine Felspar.

The only work in which I have met with this term was in a work called, (I think) Journal of Popular Science. The name is suggested by the resemblance of the mineral to close-grained loaf sugar. It is soft enough to be scraped with a knife. Fracture: earthy granular; melts before the blow-pipe. I have not analysed it, and am unable to state whether it contains potash or soda. It occurs in Southern India in the porphyritic series, and found embedded in large masses, di-

vided into prisms by cracks. In the hill of Palicondah, near Vellore, it is very common; it is never associated with quartz rock, but generally occurs where euritic granite forms hills of any size.

Schorl quartz Porphyry.

This is a rare and very beautiful rock in Southern India: it is composed of crystals of black schorl, embedded in a paste of homogeneous and translucent quartz. As I believe it is not known in Europe, at least it has not been defined by any author I have met with, it is therefore one of those rocks for which I have been obliged to invent names. To avoid loading the science with mere unmeaning words, I have proposed to take Dr. Macculloch's definition of "Porphyry," in a generic sense, as a rock composed of crystals of one mineral, embedded in a continuous non-crystalline paste of another. Thus the definition of this rock becomes "Black schorl in quartz porphyry;" and by dropping the preposition, and as I know of no schorl in India which is not black, we have "schorl quartz porphyry," which is surely a practical defining term, sufficiently convenient for use, without requiring any great jaw-deflecting exertion. It is easily distinguished from hornblende by the appearance of the crystals, which are of a jet black colour; neither lined on the surface, nor imperfectly tabular. The fracture of the crystals, irregular and conchoidal, and resplendent and shining. They are very brittle, and yield easily to the knife: melt very easily before the blowpipe, and intumesce in a peculiar manner, by which they can at once be recognised, even when very minute indeed. This rock is very different from what Boase calls "schorl rock," which he distinctly defines to be an *aggregation* with "*crystals of quartz*," is found South of Paulwole, about twenty-five miles South of Ryacottah, and in the "Trap Dyke formation of Mallapanbetta" (which vide hereafter,) in which it forms beautiful rocks with crystals of schorl, an inch nearly in thickness. It seems also to have been

mentioned by Dr. Heyne, as found near Hurryhur in Mysore. Of its associations in India I do not know much, but I think it belongs to the porphyritic or schistose series.

Schorl felspar Porphyry.

This is a rare rock, and I do not know much about it. I have only met with it forming part of the mass of the Ryacottah rock, in the veins of hornblende felspar porphyry, from which, like the last, it is easily distinguished by the behaviour of the crystals of schorl before the blow-pipe flame. It is composed of black schorl in saccharine felspar.

Schorl Rock.

I believe I may put this down in the list of those I have seen in Southern India; but as I have not any specimens at hand, I am unable to define its character, and as I cannot find any record of the examination of them in my notes, I must state what I recollect. The rock is found in mass in a deep nullah at south-east end of the (Mallapanbetta Trap dyke formation,) and almost exactly resembles black granite, except perhaps in being a little more lead-coloured and more brittle, and the structure of very minute aggregated crystals. When properly examined, it might prove to be a "black schorlaceous granite." I have never seen it in any other locality, and in consequence I suppose the specimens have been forgotten, among other pursuits.

Clay-stone.

Not common in Southern India, but occurs occasionally among the porphyritic series, and sometimes associated with white quartz; and it graduates into wacké. Fracture: dull and earthy, or imperfectly granular, or imperfectly conchoidal, or imperfectly splintery. Is harder than wacké, and differs from laterite in not being cellular; in being finer and more regular in structure, like the fracture of a brown spar; and being much heavier than an earthy rock, and a solid stone. From wacké it differs in being hard and firm, and not coarse

earthy. Ure defines it as soft and easily broken, in which he differs from Macculloch. Might be called "Ferruginous clay-stone," as all the specimens are highly ferruginous, and coloured red from peroxide of iron: and then the connection with rubble or red chalk, and red ochre, would be established.

Silicious Schist.

Not common: found only among rocks of the porphyritic series on the Topoor ghaut. Fracture, even: small grains of quartz visible in it. Is infusible. Colour, bluish black. Is Lydian stone, according to Thomson's and Ure's definition; but differs from flinty slate, in not having a slaty fracture. According to Brooke's, is flinty slate; is called black jasper by some writers. Macculloch separates two kinds, apparently much the same, into flinty slate, and a quartzose variety of argillaceous schist, which he argues have a different geological position. It seems to be a silicious variety of basalt, as some varieties of basalt do not melt easily before the blow-pipe, and only imperfectly intumesce a little, and turn white, in consequence perhaps of being silicous.

Felspar Porphyry.

Is formed of large crystals of felspar, embedded in a crystalline base of resplendent felspar. The embedded crystals are often of very large size, and sometimes of a beautiful flesh colour, which gives the rock a very handsome appearance. The felspar is characterised by being infusible, or very nearly so, before the blow-pipe, and even in a smith's forge it is hardly melted; in which it differs materially from the felspar of European petrologists. In character it does not seem to agree with the felspar porphyry, described by Bakewell; because he describes the paste or base as being formed of *compact* felspar (compact earthy felspar.) It graduates into pegmatite and graphic granite. It is a common rock in the porphyritic or schistose series, in which it forms extensive

beds; and it is characteristic of this formation, for it never forms hills or mountains, or any extensive formation of elevated points. Occurs as wall-sided dykes in the schistose series near Anchetty, west of Ryacottah, and in Congoondy, and also on the top of the Naiknairy ghaut. I may assert, I believe, that wherever I have seen it, it is accompanied with evidences of igneous action, slides, injections, dykes and metamorphic action on the adjacent rocks. I cannot help thinking it probable, that the enormous masses and formations of porphyry "said to be found in Norway," are not of felspar porphyry, but of porphyritic granite, like the Yailgerry hills of Salem perhaps. Felspar porphyry never has a cleavage, and is never used as a building stone in Southern India.

Quartz Rock

is found in great profusion in beds and dykes in the schistose series, and is commonly used for fluxing into glass with the mineral carbonate of soda, by the bangle maker. It is sometimes found embedded in granite, in irregular masses of 3 or 4 inches thick, but is not common. It is sometimes found forming small hills, but is always cracked, and so separated by irregular divisions, that a solid piece, more than 4 inches thick, can seldom be procured. The varieties it forms are—semi-transparent, rose, smoky, fat, milk, saccharine, wax; but of all these, milk quartz most commonly occurs. Is found as veins, contorted, vertical and horizontal, both in the ferraceous series and in the beds of the schistose series; but though the veins are sometimes of considerable width, (tabular veins) yet they are always separated into cracked prismatic pieces, with the irregular surfaces exactly answering to each other, (i. e. in sites.)

Granular Quartz Rock.

Formed of an aggregation of small crystals of white quartz, with a small quantity of black mica, forming an imperfect lamination, and the whole cohering rather loosely,

or not, of a very firm structure. It is very rare, and forms a small hill near Arnagherry, west of Salem, not far from the banks of the Cavery. A similar rock is called quartz rock by Bakewell, and classed as mica schist, and as primary sandstone by Macculloch.

Limestone.

This is not a correct name for this rock; but as limestone of any kind is very rare in Southern India, as a formation (excluding kunkur of course) among the primary rocks, it will do very well for the present, while no distinctions by definition are required. It is properly a perfect granite; of a firm, solid, durable structure; and possessing a perfect cuboidal cleavage, and might serve as a building material. It is a binary granite, formed of quartz and of carbonate of lime in acicular crystals, confusedly aggregated. The lustre is a beautiful pearly white, and so perfectly resembles binary granite, that I was only induced to try it with an acid, in consequence of a marked peculiarity in the appearance of the crystals, which I am unable to define. It occurs in blocks at the southern end of the Tally Mally, in the southern extremity of the Salem district, close to the Cavery. I have not seen it in sites. Ainslie seems to allude to this rock, but does not mention where it is found. I have not met with a definition of any similar limestone by European petrologists. This rock is readily disintegrated by muriatic acid, leaving the crystalline grains of quartz separated.

Wacké,

is properly applied to a soft earthy rock of the Trap family, or a basalt; but as I cast aside all such theoretic distinctions, I apply the term to a similar mineral occuring extensively in my schistose series in Southern India, and which seems to form the subsoil from which the earth of some of the most fertile tracts is derived. Its fracture is sometimes even,

and sometimes irregular, according to its hardness. In hardness, it is intermediate between dried earth and that of clay-stone. In colour—red, when ferruginous: whitish, when magnesian: reddish brown, when hornblendic. Is sometimes tuffacious. Forms the matrix of the magnesia formation of Salem, and then contains magnesia. Becomes silicious, and graduates into clay-stone when in contact with quartz rock. Is commonly intersected into rhomboidal masses by joints like trap. Is sometimes cretaceous, which is not extraordinary, as trap is also generally associated with kunkar.

Magnesite,

or more properly, the magnesia formation of Salem, is a far-famed locality: it does not *form* hills, as is asserted in some European publications, though it is sometimes found *in* hills. At Salem it occurs as an extensive series of dykes, injected veins, and reticulated veins, through other rocks. Capt. Newbold has published an account of this formation, and had I any hope of being able to visit the locality, and give up a few weeks to its examination, I would not now have noticed it. Unfortunately, while in the district, my official duties prevented more than a few morning visits. I am unable to state the extent of the formation, but believe it cannot be less than 25 square miles. It is white, hard, and compact. Lens shews no granular structure. Hardness: variable, from the toughness of a trap rock to nearly as soft as chalk. Fracture: generally conchoidal, sometimes earthy. The hardest kinds do not effervesce with acids, but the softer do. The wacké which forms its matrix, is slightly indurated when in contact with the thickest dykes. It shews all the signs of igneous action, injections, and squeezings, &c.; and is frequently very much contorted. Asbestiform minerals abound in association with it; and chromate of iron and statactitic iron ore are found embedded in the dykes. In

this meagre account of so interesting a locality, I have suppressed all remarks, except what I am certain of; it is several years since I have been able to visit the place.*

Pot-stone Steatite,

is common among the beds of the schistose series, and is commonly used for writing pencils on slates by the native bazar men. It does not form, however, any extensive beds, except near Shoragamally, north-west of Salem, where it is quarried to make cooking vessels for the brahmins, who prize it much. I have, however, never been able to visit the locality.

* The magnesite of Southern India was first brought to notice by Dr. MacLeod, now Inspector General of the Madras Medical Service. Dr. MacLeod exemplified its importance as an element in cements in which the property of hardening under water is required, and also recommended its use in medicine as a substitute for the artificially prepared carbonate of magnesia, which it equals in purity. The difficulty of reducing so hard a mineral to a sufficiently fine powder by any known mechanical means, is the only obstacle to the use of this mineral for the purpose adverted to. Dr. MacLeod himself, and many years afterwards Lieut. Ouchterlony and others, transmitted large samples of this mineral to England with a view of having it tried there in chemical manufactures, but other sources of magnesia nearer home, particularly from sea-water, were found upon the whole to be cheaper. (See vol. ii. p. 284.) Recently it has been used in the Laboratory of the Honorable Company's Dispensary, Calcutta, for the manufacture of Epsom salts; (See vol. v p. 442,) but receiving no encouragement the object was abandoned.—Ed.

Note.—As an appendix to the above excellent paper, we beg to annex the following list of Minerals in the Mysore territory, furnished to the Committee for investigation of the Mineral Resources of India, by Mr. Gilchrist, Madras Medical Service. The Minerals enumerated have been forwarded to the Committee, and form a part of its collection.—Ed.

From Major General M. CUBBON, *Commissioner for the Government of the Territories of the Rajah of Mysore,*

To the Secretary to the Government of India, Foreign Department, Fort William, dated Bangalore, 16th October, 1844.

SIR,—With reference to a letter addressed to me on the 25th January 1841, at the desire of Lord Auckland, by Mr. Assistant Surgeon McClelland, Secretary to the Committee for the investigation of the Mineral Resources of India, I have the honor to acquaint you, for the information of the Right Honorable the Governor General of India in Council, that I have despatched to Calcutta, viâ Madras, a cabinet of mineral specimens, collected by Mr. Assistant Surgeon W. Gilchrist, attached to the Public Cattle Department of the Madras Government, situated at Hoonsoor within this territory.

2. The accompanying copy of Mr. Gilchrist's list of the minerals forwarded in the cabinet, includes several specimens of the Chromate of iron, about which I was particularly desired to obtain information.

3. The package has been forwarded to your official address.

I have the honor to be, Sir,
Your most obedient servant,
M. CUBBON,

Bangalore, 16th October, 1844.

A.

1. Quartz rock, (White.)
2. Quartz rock, (Smoke grey.)
3. Granular quartz.
4. Crystallized quartz, (on Chert.)
5. Granular quartz, (Agglutinated.)
6. Silicified wood, (From Pondicherry.)
6. Silex pebble, (From desert of Suez.)
7. Silex and magnesia.
8. Flinty slate.
9. Flinty slate, (Variety.)
10. Flinty slate, (Decomposing.)
11. Chert.
12. Chert, (Variety.)
13. Chert, (Variety.)
14. Chert,
15. Chert, (Decomposed.)

16. Chert,
(With specular iron ore.)
17. Prase,
18. Quartz and prase.
19. Semiopal.
20. Jade.

B.

21. Mica,
(White.)
22. Mica,
(Black.)
23. Mica.
(Slate.)
24. Talc.
25. Talc,
(Passing into pot-stone.)
26. Talc,
(Passing into pot-stone.)
27. Pot-stone,
(With talc.)
28. Pot-stone,
(With chlorite.)
29. Pot-stone.
30. Pot-stone,
(Passing into asbestos.)
31. Asbestos.
32. Pot-stone,
(Variety.)
33. Pot-stone,
(Passing into hornblende.)
34. Hornblende.
35. Hornblende,
(Slate.)
36. Hornblende,
(Slate.)
37. Pot-stone,
(Passing into actinolite.)
38. Actinolite.
39. Actinolite,
(Slate.)
40. Compacted actinolite.

C.

41. Chlorite.
42. Chlorite,
(Slate.)
43. Earthy chlorite.
44. Crystalline chlorite.
45. Felspar.
46. Flesh-colored felspar.
47. Compact felspar.
48. Felspar porphyry.
49. Felspar porphyry,
(With talc.)
50. Glassy felspar.
51. Felspar,
(Decomposing.)
52. Foliated felspar.
53. Albite.
54. Albite,
(With hornblende.)
55. Albite and quartz.
56. Magnesite.
57. Magnesite,
(Passing into semiopal.)
58. Clay slate.
59. Clay slate.
60. Clay slate.

D.

61. Kunkur,
(Mamillary.)
62. Magnesia and limestone,
(With hornblende.)
63. Shell limestone,
(From Western Coast.)

64. Magnesia and limestone,
(Conglomerate.)
65. Maghesia and limestone,
(With quartz.)
66. Magnesia and limestone,
(With hornblende.)
67. Granular limestone.
68. Limestone,
(With chlorite and garnets.)
69. Coralline limestone,
(Western Coast.)
70. Magnesia and limestone,
(Water-worn appearance.)
71. Limestone tufa.
72. Limestone,
(With chlorite decomposing.)
73. Kunkur,
(Common.)
74. Silicious tufa.
75. Silicious tufa,
(Variety.)
76. Magnesite,
(Passing into semiopal.)
77. Silicious pot-stone.
78. Silicious pot-stone,
(Decomposing.)
79. Quartz,
(Passing into semiopal.)
80. Kaolin.

E.

81. Granite,
(Quartz, felspar, and black mica. The rock of which the large statue at Shrogoonah Bellagolah consists.)
82. Granite,
(Talc, felspar and quartz.)
83. Granite,
(Chiefly crystallized felspar.)
84. Granite,
(Felspar, attenolite, and quartz.)
85. Granite,
(Chiefly of quartz.)
86. Granite,
(Felspar and decomposed garnets.)
87. Granitic porphyry,
(Felspar, rose quartz, (Nn. Dn.) and hornblende.)
88. Granite,
(Red and white felspar and chlorite.)
89. Granite,
(Garnets, felspar, and quartz.)
90. Protogine,
(Chlorite, hornblende, and red felspar.)
91. Protogine,
(Chlorite, quartz, and felspar.)
92. Pegmatite,
(White felspar and quartz.)
93. Granite.
(Chlorite, hornblende, felspar and quartz.)
94. Graphite granite.
95. Graphite granite.
96. Granite,
(Rose quartz, white quartz and a little felspar.)

97. Granite,
(Granular quartz, granular felspar, and a little hornblende.)
98. Granite,
(Foliated structure, quartz, felspar and black talc.)
99. Granite,
(Granular felspar, quartz, and a little black talc.)
100. Granite,
(Granular quartz, hornblende, and a little felspar.)

F.

101. Granite,
(Passing into hornblende rock, foliated felspar, talc and quartz.)
102. Granite,
(Crystallized hornblende and felspar.)
103. Granite,
(Augite, adularia and very little felspar.)
104. Granite,
(Felspar and light-colored hornblende.)
105. Granite,
(Chiefly hornblende, with a little felspar.)
106. Granite,
(White felspar, talc, and hornblende.)
107. Granite,
(Chiefly large crystallized hornblende, a little felspar, and a little quartz.)
108. Granite,
(Passing into hornblende rock.)
109. Granite,
(Passing into hornblende rock, consisting of compact felspar with hornblende, and a few garnets.)
110. Hornblende rock.
111. Granite,
(Fine crystallized hornblende, felspar, and garnets.)
112. Granite,
(No. 111, decomposing.)
113. Hornblende rock.
114. Hornblende rock,
(With garnets.)
115. Augite.
116. Concentric hornblende.
117. Hornblende rock,
(Decomposing on one side.)
118. Foliated hornblende rock.
119. Augite rock.
120. Light green hornblende,
(Crystallized.)

G.

121. Crystallized hornblende,
(With a little chlorite.)
122. Crystallized augite,
(With a little chlorite.)
123. Crystallized augite,
(Felspar decomposing, and quartz.)
124. Hornblende rock,
(Hornblende quartz and felspar.)

125. Hornblende augite rock,
(With vein of felspar and quartz.)
126. Hornblende slate.
127. Hornblende rock,
(Consisting of compact and crystallized hornblende.)
128. Augite rock.
129. Granular hornblende rock.
130. Hornblende rock,
(Passing into pot-stone.)
131. Basalt.
132. Hornblende rock.
133. Basalt,
(Decomposing into lithomargic earth.)
134. Basalt.
135. Hornblende porphyry.
136. Hornblende porphyry,
(Decomposing on one side.)
137. Augite rock,
(Nearly compact.)
138. Light green hornblende,
(Nearly compact.)
139. Augite rock,
(Nearly compact.)
140. Augite rock,
(Nearly compact, rhomboidal structure.)

H.

141. Concentric hornblende rock.
142. Augite rock,
(With adularia.)
143. Hornblende rock,
(Decomposing outside.)
144. Syenite.
145. Augite rock,
(Granular structure.)
146. Lithomargic earth,
(The debris of basalt.)
147. Augite rock.
148. Syenite.
149. Augite,
(Coarsely crystallized.)
150. Silicious pot-stone,
(With crystallized needles of tourmaline.)
151. Basaltic porphyry,
(From Nagpore.)
152. Felspar porphyry,
(Paste felspar, embedding with crystals of felspar and green-colored crystals of green tourmaline.)
(Seringapatam.)
153. Felspar porphyry,
(Containing foliated crystals of red felspar.)
154. Granular augite or hornblende,
(Decomposing.)
155. Laterite,
(Western Coast.)
156. Laterite,
(Western Coast.)
157. Laterite,
(Northern division.)
158. Laterite,
(Western Coast.)

59. Laterite,
(Consisting of granular quartz, and specular iron ore.)
60. Laterite,
(Specular iron ore, and quartz.)

I.

61. Sandstone,
(British.)
162. Green sandstone,
(British.)
163. Iron sandstone,
(Western Coast.)
164. Sulphureous clay,
(Western Coast.)
165. Coal, (British.)
166. Iron sandstone,
(Western Coast.)
167. Iron sandstone,
(Coarse granite. Western Coast.)
168. Iron ore,
(In chert.)
169. Iron sandstone.
170. Stalactitic iron ore,
(Northern division.)
171. Iron glance.
172. Radiated iron ore,
(Western Coast.)
173. Iron ore,
(Western Coast.)
174. Magnetic iron ore,
(Rhomboidal structure.)
175. Magnetic iron ore,
(Course granular.)
176. Specular iron ore.
177. Chromate of iron,
(Coarse grain.)
178. Chromate of iron,
(Fine grain.)
179. Chromate of iron,
(With granular hornblende.)
180. Glance iron ore.
(Cellular structure.)

J.

181. Garnets.
182. Obsidian.
183. Lydian stone.
184. Porphyrytic Lydian stone.
185. Bottle-green hornblende,
(With chromate of iron.)
186. Silicious clay-stone.
187. Friable sandstone.
188. Sandstone,
(English.)
189. Very coarse grained iron ore.
190. Augite, rock,
(Augite adularia and felspar.)
191. Adularia,
(Compact augite with foliated adularia.
192. Supposed to be granular quartz,
(Colored green with chromate of iron.)
193. Granite,
(Consisting of augite, felspar and quartz.)
194. Clay slate,
(British.)

195. Granular talc.
196. Felspar,
(Passing into kaolin.)
197. Granite,
(Consisting of felspar, quartz, black talc, and tiemolite.)
198. Pegmatite.
199. Augite,
(Nearly compact.)
200. Foliated hornblende.

K.

201. Lithomargic earth,
(The debris of basalt.)
202. Lithomargic earth,
(The debris of hornblende rock.)
203. Granite,
(Seringapatam.)
204. Granite,
(Quartz and hornblende.)
205. Granite,
(Quartz, somewhat striated hornblende, felspar.)
206. Granite,
(Quartz, felspar, and black mica.)
207. Granite,
(Felspar, quartz and black talc.)
208. Granite,
(Felspar, quartz and talc.)
209. Granite,
(Felspar with a little quartz, and a little talc.)
210. Granite,
(Felspar, rose quartz, and hornblende.)
211. Granite,
(Hornblende granite.)
212. Hornblende rock,
(With a large portion of iron ore.)
213. Hornblende,
(Passing into chlorite.)
214. Granite,
(Hornblende granite; variety.)
215. Granite,
(Hornblende granite; variety.)
216. Pumice stone,
(Straits of Malacca.)
217. Ochre.

Abstract of labours in Rational Pathology since the commencement of the year 1839. *By Professor* HENLE *of Zürich.**

Pus in the blood.

Pus cannot be recognised in the blood, because its globules are not distinguishable from those of lymph. Although Gulliver found the pus globules large, more irregular, generally darker-coloured, and more numerous, and often hanging together in clusters, while he always found the lymph globules swimming singly and detached, yet these characters are not certain; for the size of both kinds of globules varies according to the stage of their development, and according to the thickness of the plasma, and indeed smooth and angular globules occur near each other in both fluids, and Henle has often seen lymph globules clustered together in healthy blood, and their number vary much. (It is greatly increased by loss of blood.) Donné says, that blood containing pus is turned into a jelly by ammonia, like pus itself: but this is only the case when the number of pus globules is very great; and it seems likely that this may also be the case, when there are many lymph globules present. L' Héritier has proved Mandl's method of distinguishing pus-containing from pure blood, by the softness of the fibrinous coagulum to be insufficient. Yet there is no doubt of the occurrence of pus in the blood (Pyæmia,) and we know too that it cannot pass into uninjured vessels; and people have thus come to the conclusion, that it is formed within the veins themselves by their participating in the inflammatory process.

According to this explanation, the pus globules, when mixed with the blood are supposed by their large size to block up the capillaries, and set up a new inflammation. (Secondary and metastatic abscess). But many facts are opposed

* Abridged from the Zeitschrift für Rationelle Medizin of 1844, and translated for the Calcutta Journal of Natural History.

to this mechanical explanation: for instance, absorption of pus into the pulmonic circulation ought always to produce abscesses in the lungs; and the capillary circulation ought to be obstructed by an excess of large lymph globules, as well as by pus, and we thus find ourselves thrown back on the old humoral pathology. Thus Stannius and Pirogoff ascribe to the pus globules an irritative action on the coats of the veins, Engel compares them to the minute fungi of fermentation, and assumes that they have the power to convert the blood into a state of purulent fermentation. But every view of the action of the pus globules on the blood must remain hypothetical, till their presence in it is proved.

I.—*Inflammation and regeneration of special textures and organs.*

a. Bones.—In well-set fractures of bones that are rich in vessels, consolidation takes place without any exsudation between the periosteum and the bone, simply by exsudation from the broken surfaces (Lambron). Heine's preparations of regenerated bones have refuted Miescher's opinion that their re-production proceeds only from the substance of the bone, in as much as whole bones excised along with their periosteum have been reproduced, although in an imperfect manner. Klencke observed the formation of new diaphyses in the hollow bones of doves through the medium of the soft parts. The regenerated osseous substance was hard, white, and less vascular than ordinary bone. Textor confirms Heine's observation, that the compact part of the hollow bones is easily reproduced, but not the articular extremities: he found in their place in the larger joints a kind of meniscus, to which bands from the bones and muscles in the neighbourhood were attached. Karawajew also observed the complete reproduction from the periosteum of an excised piece of rib, some inches long. *Unhealthy inflammations and*

suppurations leave, according to Rokitansky, various impressions on the bones. *Syphilis* produces thickening of the osseous texture, with increase of thickness and weight in the flat bones, along with an uneven knobby surface, and in case of ulcers a round depressed scar, puckered in a radiating form. *Scrofulous* inflammation is characterised by spongy softening, enlargement of the cells, and thinning of the walls: the suppuration takes place from the laid-bare and expanded cellular tissue, and when the process penetrates deep, forms a honey-combed sinus, when bone is thrown out in the form of velvety foliated exostoses. The *cancerous* degeneration is distinguished by the absence of softening, of new formation of bone, or of induration in the immediate neighbourhood of the corroded spot. *Arthritic* inflammation of joints causes enlargement and flattening of the knee-pans, levelling of the surface and edges of the ends of the bones, osseous vegetations of a shelly stalactitic form in the neighbourhood, loss of the cartilages, and a gypsumlike polish of the laid-bare medullary substance (by the deposition of a chalky earth, said by V. Spécz to contain about 8 per cent. of lithic acid.) On the long bones, thickening of the cortical substance and warty or shelly vegetations are characteristic.

b. Cartilage.—Liston distinguishes three kinds of ulcerative destruction,—from disease and swelling of the synovial membrane; from swelling and vascularity in the tissue between the bone and cartilage; and from suppuration and inflammation of the cartilage itself. Albers speaks of inflammation of the ossified or unossified epiglottis. Rokitansky and Henle do not believe in inflammation of normal sound cartilage, and think it is destroyed only by the effects of inflammation in the neighbouring tissues. Klencke thinks, contrary to the opinion of all, that cartilage is capable of regeneration.

c. Muscle.—According to Klencke's experiments on the regeneration of muscles, membrane is alone produced in the place of the muscle removed, and it contains much lime, does

not re-act from galvanism and mechanical irritants, but contracts in cold water, and when dissolved in acetic acid is not precipitated by ferrocyanide of potass.

d. Serous membranes.—The conditions for the production of the so-named hæmorrhagic exsudations of Lännec, are according to Rokitansky partly general, (as the tubercular diathesis) partly local, (at times simple inflammation, or repeated inflammation in some imperfectly organised false membrane, from the imperfect or too delicate structure of the new vessels.) This exsudation forms a coagulum, which may be more or less thick and consistent, adherent to the walls of the cavity, rich in colouring matter, or white, within which the red effusion is kept fluid. The coagulum changes into a resisting leathery layer, which becomes at most only partially organised: the enclosed fluid grows brown or yellowish, and clear, and its secondary deposits get the consistence of a kind of pulp; re-absorption is rare: death usually results quickly from exhaustion; in the most favourable cases, after the re-absorption of the fluid, a breaking down of the periphery of the coagulum takes place, inside which is found a rusty-coloured or yellow layer. In the peritoneum hæmorrhagic exsudations assume a black and blackish-blue colour from the action of the gas contained in the bowels (Melanosis stratiformis.) Of the so-called milk spots in the heart, Skoda and Kolletschka distinguish two sorts—those *on* the serous membranes are the effects of pericarditis, the others *under* them are caused slowly by repeated determination of blood to the part. Paget considers it impossible to determine whether these spots are situated above or below the serous membrane, and considers them to be always the result of inflammation, because adhesions in the form of fine threads between the large vessels are found along with them. Paget considers pericarditis to be a very common disease, for out of 58 bodies he found traces of it in 11. He thinks that it often occurs (though overlooked) in many acute diseases, and in typhus.

e. Arteries.—Their redness from imbibition is to be distinguished from that from inflammation, by this, that it is chiefly confined to the inner coat (the epithelium), and ceases entirely in the middle one. Levy observed inflammation and its effects in the umbilical artery in 14 out of 15 cases of newborn children who died of tenesmus. Schöller remarked a case of inflammation of the umbilical artery without trismus.

f. Veins.—The progress of inflammation in veins otherwise sound, is not (according to Pirogoff and Reumert) so rapid, as is commonly supposed: Stannius thinks it doubtful whether from constitutional causes apart from local irritation, inflammation of individual branches of veins can develop itself. Hetherschij found all the veins of the lower half of the body after puerperal fever filled with a soft, yellowish-red, dry, pus-like mass mixed with normal blood: he believes that this coagulum was not the product of the inflamed coats of the veins, but only deposited in them. Stannius has observed the complete re-absorption of obliterated veins along with a thrombus, (in which also small vessels were observable.) Of cases of inflammation of particular veins, there have been observed, phlebitis of the sinuses of the dura-mater in consequence of purulent otorrhœa, and phlebitis of the vena portæ.

g. Brain and its membranes.—Kellie and Abercrombie think that, from the slight compressibility of the brain and the fixedness of the cerebral parietes, no universal increase or diminution of quantity in the contents of its blood-vessels can take place, and therefore, that in cerebral congestions there can only be an alteration in the proportions of arterial and venous blood. To this Cohen opposes the facts of the flattening of the convolutions, in cases of water in the ventricles, and of the brain being overfilled with blood, and reminds us that in many cases the over-compressed brain, when once extracted, cannot be made to return within the cranium. Yet he admits, that positive overfilling and real compression of the brain by blood or serum are not so often indicated

as people imagine, and that we are not always to assume absolute overfilling of the brain with blood, when after sudden death in cerebral cases, the veins of the pia-mater are found distended with blood, for this is also the case after bleeding to death. He considers, therefore, that the actual injury to the brain in irregularity of its circulation, is not caused by compression from absolute excess of blood or of serum, but by the proportionate excess of the one over the other, and hence it follows, that for the integrity of the brain a certain quantity of blood is necessary. Durand-Fardel describes a peculiar kind of inflammation of the brian, which comes on with the symptoms of apoplexy: the pathological characters are: extensive redness and swelling of the convolutions, superficial softening of the grey substance, and adherence of the duramater. He explains the want of inflammatory symptoms by the compression to which the brain is subjected by the swelling of its convolutions. Gluge considers inflammatory congestion of the cerebral membranes to be proved, only when fibrine has been effused, which then appears in the form of whitish spots or false membranes: suppuration is a rare result of meningitis. According to Engel, however, the exsudation of the arachnoid is sometimes fibrinous, sometimes serous, purulent, and even bloody. The flakes in serous exsudations consist of pus globules. According to Gluge, the existence of numerous blood points in the white substance indicates that there has been congestion. Engel and Henle think that a uniform redness of the cerebral substance indicates it. Toughness of the cerebral substance, particularly the white part, has been observed by Nasse and Albers after congestion of the brain in typhus: the white substance was firm, shining on its cut surface, and poor in blood. Disputes continue regarding the inflammatory character of hydrocephalus acutus, and the hardening and softening of the brain: several of the later writers will not admit that hydrocephalus A. is inflammatory. Cohen

can discover in the exsudations no character of inflammatory secretion: Gluge considers the effusion of fluid an increased secretion of the normal cerebro-spinal fluid: Scharlau thinks the same is caused, not by increased effusion, but by diminished absorption: Vogt looks on the effusion of fluid as comparatively unimportant, and thinks hydrocephalus a process analogous to the softening of the brain in adults, and which takes place either in the brain itself or in the arachnoid; but he considers rammolissement, and also acute hydrocephalus as consequences of a chronic process of inflammation, which he terms liquescent, venous, or typhous; he looks on rammolissement as an organic maceration caused by previous changes of the firm part and of the serum, from the effect of chronic inflammation. Durand-Fardel declares the red softening to be always acute, the white to be chronic. Eisenmann, on the other hand, thinks the red discoloration is only a peculiarity of the first stage of softening, which easily passes by. He lays down four stages:—1st, incipient softening, with redness of the cerebral substance; 2nd, the substance becomes pulpy, the red colour passes into yellow, and disappears finally; 3rd, cavities form in the cerebral substance, filled with a milk-like fluid, the cortical substance becomes a gray pulp; 4th. cicatrization: on the surface, the yellow and at a later period colourless flattened spots are the cicatrices, in the interior, the fallen together walls of the cavities, after the absorption of their fluid contents. He considers inflammation to be the proximate cause, and that it produces a serous effusion, which weakens the cerebral substance. Gluge considers that rammolissement is in most cases of an inflammatory nature, as he found in the softened places inflamed globules among the fragments of the cerebral tubules. Yet these globules were also found just as much in other as in inflammatory effusions, especially in effused and coagulated blood. Probably they are blood globules directly metamorphosed, which are at first red, but latterly by some peculiar chemical

process become yellow, and at last colourless; yet they may also be produced in other ways as they occur in exsudations that contain no blood globules. It seems probable, that the peculiar shade of colour of the softened brain arises from these globules. In the yellow flattened spots into which the cortical substance becomes changed, Henle has observed besides the different kinds of inflamed globules and vessels, other peculiar fibres (of effused fibrine) and certain small flattened spots (of a fatty substance). Valentin describes two species of rammolissement, a coloured, and a colourless: in the latter the brain globules are soft and without form, the nervous tubuli varicose frangible and easily falling into globule-shaped fragments (which are very likely often mistaken for inflamed globules, as by Gluge and Bennett.) In the coloured form, something new is added to this simple degeneration, namely a quantity of broken-down granular globules, whence the colouring arises. They are like the pigment cells, with this difference, that the included granules are brown and less highly coloured. But as the pigment cells differ from the exsuded corpuscles in containing fat, Henle thinks that the destroyed nervous fibres themselves supply the material from which the globules are formed. Gluge produced softening of the brain in rabbits, by running needles into the cerebral substance; but in this case blood was always effused, so that it is not yet proved that softening and the production of inflamed globules are the results of pure inflammation. All softenings have this in common, that they are caused by the maceration of the cerebral substance in exsuded or extravasated bloody fluid. Carswell describes an additional form of rammolissement, the result of atrophy or of gangrene in the other soft parts, and the consequence of deficient nourishment, by the closure of the vessels leading to the brain. In hardening of the brain, Gluge found the primitive fibres quite altered, and of irregular form, as if compressed.

h. Nerves.—Their regeneration takes place, according to Valentin, as follows:—The exsudation between their ends is

first converted into cellular tissue, in which there is then deposited in streaks, an oily, at first yellow, but at a later period white substance, which unites the extremities of the nervous fibres, while it proceeds from either end. If no union takes place, the ends of the nerves grow thin, become transparent, and adhere by means of fine cellular tissue to the neighbouring parts: the primitive fibres lose their contents, and the sheathes continue in the form of thin weak fibres. According to Nasse, the newly formed nervous fibres are rather narrower than the original ones. The shortest time in which sensibility has been restored along the course of a divided nerve, was 8 weeks, according to Günther and Schön. It is remarkable that only nerves of the same class unite again (Bidder). The newly formed nervous fibres are longer in being able to respond to the influence of the will, than to mechanical or galvanic irritation.

i. Alimentary canal.—After the use of tartar emetic, Marion de Procé has observed a pustular eruption, not only in the lower part of the æsophagus (like Rokitansky,) but also in the pharynx and throat, with the mucous coats of the stomach and small intestines in places reddened and injected. Hodgkin regards as a sign of fresh acute inflammation of the mucous membrane of the stomach after poisoning, a number of scattered small, almost opaque, whitish spots deeply seated in the mucous coat. Briquet and Cruveilhier describe a chronic inflammation of the follicles of the stomach and intestines: the mucous membrane was otherwise normal, but studded with small swellings (from a few lines in diameter to the size of a pin,) which in some places were flat, lens-shaped, and white, in others had pedicles, were egg-shaped, reddish, or violet-coloured, without any opening, but filled with a thick mucous fluid: no doubt this was a fungous alteration. As to the perforating ulcer of the stomach, which, according to Rokitansky, occurs more frequently than is commonly supposed, Dahlerup disagrees with him in many

respects, and says that it occurs oftenest in the coats of the stomach about its cardiac extremity: he thinks round form is caused by the action of the muscular coat, which retracts on all sides after it is perforated. Cruveilhier and Mohr think the ulcer consists in inflammation and ulceration of the glands of the stomach; Rokitansky, in an acute red softening, or a sloughing, which kills the mucous membrane; Siebert calls attention to the connexion between these perforating ulcers and diseases of the brain and spinal column. *Perityphilitis*, or abscess of the iliac fossa on the right side, happens occasionally, according to Grisolle, as a consequence of inflammation of the cœcum or of the vermiform appendix. It occurs commonly in men, in women chiefly after child-birth, when they do not suckle. The pain attending it is at times felt in distant parts, in the whole lower part of the body, and in the groins: from pressure of the pus on the nerves, the legs become benumbed or the seat of deep lancinating pains: pressure on the veins causes œdema: suppuration generally supervenes, and the pus makes its way out through the skin, the alimentary canal, or the bladder. Riedel has met with a case of a communication between the cœcum and ileum through the vermiform appendix.

k. Salivary glands.—Of inflammation of them, Cruveilhier distinguishes three varieties:—1st, inflammation of the excretory ducts and the granules of the gland (which most commonly extends from the centre to the periphery); 2nd, of the interstitial cellular tissue; 3rd, of their veins. He never saw suppuration of the parotid without simultaneous gangrene, a fact explained according to him, by the close texture of the gland.

l. Liver.—Becquerel considers cirrhosis, or granulated liver, to be a hypertrophy of the yellow substance, caused (in consequence of habitual congestion) by the infiltration of a plastic material, which afterwards contracts, and thus causes atrophy. According to Hallman, there are imbedded in a

fibrous mesh-work, in some places granulations of rather large liver cells with a few drops of oil, in others free fat cells. The fibrous tissue consists partly of closely packed cells, partly of firm thin fibres. The increased quantity of these fibres in cirrhosis accords with the increased quantity of lime in the liver (it contains 5 times as much.) J. Vogel reduces the structural alterations of the parenchyma of the liver to four forms:—1, deposition of fat; 2, filling of the cells with deep yellow or saffron coloured granules; 3, deposition of irregular masses of a brown pigment between the liver cells; 4, deposition of masses of small intensely dark granules (pigment) between them: Henle cannot however regard these alterations as characteristic signs of cirrhosis, (i. e. that condition in which the liver is small, hard, lumpy or granular, and pervaded by a whitish grey cellular tissue in bands:) he thinks that in this affection, the peculiar characteristics of the parenchyma, and the formation of the accidental fibrous bands (which he regards as an important point of the disease) ought to be considered separately. In this fibrous tissue, Henle recognizes either cellular tissue, or numerous interlacing layers of flat parallel fibres with granules and granule fibres, (like the fibres of organised muscles, poor in blood vessels, and with a constant tendency to contraction.) The yellow granulations are the remains of the substance of the liver: beyond this point, we need microscopic observation to shew the real degree and cause of the alterations in the structure of the liver granules: the glandular cells are rich in fat, and become in part entirely converted into bladders of fat, or new fat cells are developed between them: from these is derived the yellow colour of the liver in cirrhosis. The two actions concerned in the cirrhotic process, deposition of fat in the gland cells, and formation of fibrine do not bear any necessary relation to each other: the deposition of fat at times occurs alone without atrophy, or contraction of the yellow spots, (for instance in the fatty liver in which Hallman

and Valentin found the same alteration of the cells as in cirrhosis.) The fatty degeneration is, however, no more a peculiar disease of the liver than diabetes is of the kidneys, but a symptom of a diseased state of the blood, the excess of fat in which the liver cells have to separate. According to Rokitansky, the parenchyma of the liver granules in cirrhosis may be of very various structure, either quite normal, or as it is found in the fatty, atrophic and nutmeg liver, so that the cirrhosis is an accidental combination: the new fibrous tissue is the really important degeneration, and probably the result of inflammatory exsudation. Exsudation may, according to Becquerel, be the result of venous congestion and stagnation of the blood, from excessive extension of the secreting canals, in consequence of blocking up of the secretions. Bright's disease which often occurs along with cirrhosis, arises probably from the same cause, namely heart or lung disease. Pain is a rare symptom in this disease as is icterus, but œdema of the feet and dropsy of the belly are seldom absent. As to shades of color in the liver, Henle says, that the division of the liver into red and yellow substance does not correspond with any actual difference in tissue, and least of all that of investing capsule and acini*. It arises solely from a peculiar division of the blood vessels. In the axis of each lobule of the liver there is a venous twig, (of the vena Hepatica): at its periphery these are arterial twigs, (which accompany the vena portæ) communicating with each other by capillary vessels, which pervade the lobule, and are wider towards the axis than towards the periphery. According then as the blood is uniformly diffused, or retained more in the venous or in the arterial parts, so is the colour of the liver uniform, or marked by yellow and red spots. As the blood usually at death passes from the arteries into the veins, the centres of the lobules are commonly red, the periphery yellow, but the reverse may also be the case.

* This is merely Kiernan's account.—*Tr.*

m. Pancreas, according to Claessen, the symptom of acute pancreatitis is, a slight kind of drawing together pain, united with remarkable anxiety, which bears no proportion to the violence of the accompanying stomach symptoms. The tongue is moist and clean or with a white coating; the fever trifling. Resolution and induration of the organ have been observed as its sequelæ, never suppuration or gangrene. This inflammation does not appear to arise, as some have supposed, from the use of mercury, or from the suppression of the salivary flow, indeed the sympathy between the pancreas and the salivary glands has been assumed without warrant. Chronic inflammation shews itself by pain, copious dejections and vomiting of watery and slimy fluid (coming from the stomach) loss of appetite, excessive thirst, obstinate constipation and falling away.

n. Organs of respiration. Angina externa comes on, with or without slight fever, or with a feeling of lassitude and rheumatic pains, as a hard swelling, but neither hot, red nor painful in the submaxillary, parotid, or laryngeal region especially of the left side. As it increases, difficulty of speaking and of swallowing occur, but without any inflammatory symptoms in the mouth or lining of the air passages: there is in addition fever with nightly exacerbations. The terminations are, resolution, or death with the symptoms of putrid fever by suffocation, either before or after evacuation of the contents of the swelling. The fluid evacuated is ichorous. Either gangrenous destruction of the cellular tissue (of the muscles and nerves in the neighbourhood, not of the salivary glands) or infiltration of it with lymphatic albuminous fluid, are found after death, or both. Henle sees in this inflammation an excellent example of obstructed action in the absorbents; but this obstruction is distinctly related to the rheumatic process; its most usual exciting cause is exposure to cold. Hennemaen names as *epiglottitis chronica exsudativa*, a disease, in which from time to time a whitish crust of inflammatory

exsudation, of the form of the epiglottis (?) is expectorated with a violent cough that often lasts for hours, and with excessive difficulty of breathing preceding it.—The seat of pneumonia, according to the consent of most modern authors, is in the mucous coat of the minutest lung-cells, and the granulations of hepatised lungs are formed by the filling of these cells with exsudation: on this account they are largest in full grown and in emphysematous lungs.

o. Kidneys.—Bright's disease is, according to Henle, a morbid action exactly similar to that of cirrhosis of the liver: in both, elementary granules, fat, and cellular tissue in its various stages of development, are found between the elementary parts of the glands, in both is the gland at first thereby swollen, and becomes afterwards atrophic, and granular by their contraction. Of both, there is an acute and a chronic form: the first of these appears to differ from pure congestion and inflammation of the kidney only in degree and in extent, and perhaps also in the source of the exsudation, in as much as it is thrown out chiefly by the arterial portion of the capillary system in pure inflammation, chiefly by the venous in cirrhosis and in Bright's disease. The various forms of Bright's disease described by different observers, are only stages of the same affection.

p. Eyes.—Although many writers speak of alterations of the *corpus papillare* of the conjunctiva in blennorrhœa of the eyes, yet Engel and Henle prove that they do not take place. What has been called hypertrophy of it, consists in the plastic matter, deposited upon and in the tissue of the conjunctiva, becoming organised. Nasse calls attention to a form of inflammation of the cornea in women who are nursing, which at first attacks only one eye, and is remarkable from its tendency to form ulcers: he thinks that it is caused by impoverishment of the blood, (anæmia from excessive secretion of milk, like keratitis in animals whose blood has lost its fibrine.) Schröder van der Kolk regards a

chronic and exsudative inflammation of the choroid as the cause of glaucoma: the exsudation is deposited between the choroid and the retina, and displaces the latter: thence the amblyopia. Sichel explains the green colour of glaucoma, by supposing that the bluish choroid is seen, through the lens and vitreous body, deprived of its pigment. The crystalline lens is reproduced (according to Pauli, Löwenhardt, Textor and Valentin) in animals, and in man after the operation for cataract: the new formed substance resembles exactly the normal*.

q. Skin.—According to Rosenbaum, cutaneous eruptions are diseases of the glands of the skin, especially of the hair follicles: but papulæ and pustules occur on parts of the cutis and on mucous surfaces, where neither hair nor hair follicles occur (as on the palm of the hand, the glands, and the conjunctiva) many papular eruptions, such as lichen, psosiaris, &c. do no doubt proceed from the hair follicles.

II.—*Miasmatico-contagious Diseases.*

Of late years two chief theories regarding contagion have been advocated. The one seeks to explain the action of infectious matter (like that of ferment) by its chemical and physical properties. The other (the parasitic theory) regards the infectious matter as an organic existence, having an independent life of its own, with the power of propagating it.

Chemical theory.—This rests on the principle "of the transposition of atoms by being shaken." In certain bodies the molecules are supposed to be kept together so very

* The general result of the numerous experiments, which have been made in the transplantation of the cornea from the eye of one animal to that of another, appears to be this—that there is not much difficulty in getting the transplanted cornea to become attached in its new position, and that in a few rare cases the cornea remains transparent for a day or two, but that in the end it always becomes opaque, or quite useless for vision. A recent writer on this subject in Dr. Finch's Journal, does not appear to be aware that this operation was practised on the human subject, at least seven years ago.—*Tr.*

weakly, that every mechanical alteration by warmth, friction and contact with indifferent bodies, causes such a disturbance among their molecules; that they separate, and then form anew, fresh and more natural combinations. Substances, when in motion and in the act of transposing their molecules, are supposed to communicate their motion to other substances, just as ferment or putrefying matter does to sugar, the elements of which then form more simple combinations, such as alcohol and carbonic acid. Although Liebig now tries to add new positive weight to this theory, it is in fact a repetition of the old doctrine, that the spreading of fermentation and of contagion are analogous processes. On sufficient consideration this theory has been found utterly untenable—as little tenable is Naumann's chemical theory of contagion. Winther tries to make out ammonia to be the actual matter of contagion, while Liebig regards that substance as only the medium of the gaseous form of contagion. But all chemical theories have a radical defect: they are not even hypotheses; they do not explain facts, but hidden conjectural phænomena, and lay down the necessity of the operation of causes, which after all may not operate at all. It is indeed often assumed, but it never has been proved, that contagion always reaches the blood: it is just as uncertain that it is afterwards thrown out of it, as it is certain that pustules, papulæ, &c. are not the secreting organs of contagion, but the result of inflammation of the skin. A theory of contagion, that makes pretension to the character of a philosophic hypothesis, must begin not by assuming the mutual action of infectious matter and blood, but with the phænomena of contagions and contagious diseases, that is with the operations of contagious matter, which are real and appreciable by our senses, and this method conducts us to the other theory.

Parasitic theory.—Holland looks for the parasites in the animal kingdom (especially among insects), and regards ill-

ness as the consequence of a kind of poisoning by them. Henle, on the contrary, from his discoveries in fermentation and putrefaction, and regarding the muscardine of silk worms, is led to the conclusion, that infusoria and the lower forms of plants are the sources of contagion, and cause disease by the presence of their germs in the body: it is therefore necessary to determine the existence of contagion and miasma, their forms and organisation, and the course of miasmatic and contagious diseases. Henle divides the diseases to which a miasmatic or contagious origin is ascribed, into the three following groups:—1. *Pure miasmatic disease* (intermittent fever): in it miasma has not been detected either in or out of the body: it does not wander, but remains fixed in certain localities: there are no proofs, that it is inorganic, rather than a physical agent. 2 *Miasmatico-contagious diseases* (such as small-pox, measles, scarlet fever, typhus, &c.) arise from miasma (i. e. from something injurious in the air,) and also from contagion (i. e. something injurious derived from a sick body.) The miasma and the contagion of the same disease must be identical in their nature, (for like effects have like causes): the contagions of all these diseases are transient, and therefore it is probable that what is called the miasma (or infecting material of these diseases) is only a transient contagion, or vice versâ. 3. The *purely contagious diseases* (syphilis, itch, &c.) which never occur from miasma, have a contagion which is not transient. The cause of miasmatico-contagious diseases, appears as contagion or miasma, according as its origin can or can not be traced from a sick body. The fixed contagion of purely contagious diseases is infectious matter, contained in a solid or a fluid substance taken from the diseased body, commonly mucus or slime. It is thus, properly speaking, not contagion itself, but only the vehicle of it. The process by which it is prepared is the ordinary one of inflammation. The vesicles, pustules, &c. which contain the pus are the ordinary results of inflammation

of the skin.—The physico-chemical properties of contagions shew, that their matter must be organic. From the way in which they act, it follows that the matter of contagion is alive, and indeed endowed with individual life, and that it bears to the diseased body the relation of a parasitic organisation. Contagions, as is proved by the course they run, and by the phænomena of the illness produced by them, possess two properties which do not belong to any formless or dead matter: the power of multiplying themselves on food, and by the assimilation of foreign organised bodies, and a certain power of periodical development limited by certain conditions, (they either run a chronic course, or they have a fixed succession of stages.) The spreading of contagions on the diseased body is thus either limited or unlimited: all contagions have a mode of propagation, which corresponds with that of higher organisations. We do not need to assume *equivocal generation*, if we admit that the germs of infectious matter may lie, out of the diseased body, as the germs of the lower organisations do, out of fermenting and putrefying substances, in a state capable of development, and only wanting favourable conditions for their propagation. These conditions appear to be: external ones, such as certain atmospheric relations: and internal ones, such as changes in the body, which render it fit for the support of parasites. In the same way, the conversion of merely miasmatic into contagious diseases, if the fact were once indubitably proved, could be explained without the aid of *equivocal generation*. Purely miasmatic disease, such as ague, catarrh, diarrhœa, &c. would be the means by which the human frame is rendered capable of receiving the infectious matter, which when once taken in, is propagated in the form of contagion. Thus it is only the origin of infectious matter and of contagion that remains hidden; but this is the case with all organisations, nay with all matter.—It remains now to examine, whether contagion be conditionally or absolutely independent, (of vegetable or of

animal origin.) We may consider as endowed with relatively independent life, the elemental forms of organisations, which inherit the power of nourishing and of propagating themselves, only as parts of an organic whole, though they do not instantly die on separation from that whole. Many reasons make us suspect, that the contagious organisations belong to the lower kinds of plants and animals, (in short, have an absolutely dependent life of their own). Thus the origin of epidemic diseases can often be traced to circumstances, which favour the development of the lower animal and vegetable organisations; for instance, the destruction of organic substances, in overfilled or ill aired spaces. The means, which favour, impede, or destroy the action of the infectious matter, are the same which are favourable and destructive to the life and reproduction of the known lower organisations. Of late years an infinite number of such low parasites has been discovered, occurring in plants as well as in animals and men; and on comparing the action of contagions and miasmas with the consequences of the formation of parasites in the lower animals, we are struck by many analogies: from this comparison the following results may be deduced:—1. Purely contagious diseases are caused by parasites whose germs do not maintain themselves in the air, or in a dry condition (itch); those parasites may be considered as a middle grade, which cannot maintain themselves for a long time dry: in short, those diseases which are infectious, through the medium of air it is true, but only in the immediate neighbourhood of the patient, (glanders, consumption). To produce epidemics, a contagion must be motionary: but every motionary contagion does not necessarily produce epidemics, only one, for which the constitution has a general predisposition (for instance the contagion of Tinea.) 2. Miasmatico-contagious disease occurs in individual cases and epidemics, purely from miasma: in such cases the parasite lives and grows, but does not form any fruitful germs within the diseased body. The degree of contagiousness is also de-

pendent on the place of growth of the parasite, and on the way in which it is thrown off. The contagiousness is smaller, if the parasite vegetates in the bowels, than if it be on the skin or in the lungs. 3. Diseases are chronic, if the power of propagation of the parasite is not limited; acute, if after a certain time it forms germs, and if the body in which these germs are formed does not offer a bed adapted to their further development. 4. Predisposition, is the capability of a body to form a nursing bed for the parasites, without the capability of resisting their action. For every parasite does not make the body on which it lives unhealthy: on the contrary, nature is able to render this, as many other injurious influences, innocuous through habit, or to compensate for them by nourishment. Contagions have, like all organisations, specific preferences for particular soils and climates. Some like a healthy body (most acute miasmatico-contagious diseases:) others prefer a weakened and reduced one (aphthæ.) On the whole, the attraction and the development of parasites appear to be favoured by a congested state of the surface, on which they most usually spread, perhaps on account of a partial separation of them from the surface being caused by congestion, as the parasite of dysentery and cholera by diarrhœa, of typhus by gastric fever, of influenza by sneezing. As for entozoa, so for contagions, there is a predisposition according to the age and kind of animal: and in both the want of such predisposition may be limited or unlimited. Contagion can become milder by germinating in different families, or by repeated inoculation, without losing the power of re-appearing again in full force under favourable circumstances, (small-pox). The destruction of the parasitic bed when the disease is over, reminds us of the succession of different kinds of animals and vegetables in infusions, in which each kind after a time exhausts the bed fitted for its production, or rather for its nutrition. 5. The miasmatico-contagious diseases are distinguished into local,

(if the parasite has no disposition to spread beyond the points of inoculation, or if it is tied down to certain parts of the body,) and general. In the latter, the following conditions may occur:—*a.* the parasite spreads over the whole surface of the body or over the greater part of it: *b.* it may not be the parasite itself, but the diseased condition of the skin induced by it, that spreads by continuity and by sympathy: *c.* the parasite passes into the blood, and through it into all organs: *d.* the parasite, in the place in which it is fixed, may act on the blood circulating through that spot, and so at last get into the general circulation: *e.* the symptoms of a disease of the whole system manifest themselves by means of the sympathy of the nerves. 6. In relation to the seat or germ-beds of contagion, parasites may be divided into three classes—*a.* parasites of the inner and outer surface of the mucous linings and of the skin: to this belong itches, tinea, and most miasmatico-contagious diseases; their passage into the blood is possible, but not necessary: *b.* parasites of the fluids; here the blood and the secretions are the vehicles of contagion; the eruption is wanting or is unimportant: to this belong hydrophobia and possibly the plague: *c.* parasites which grow on the skin as well as in the fluids, which begin by germinating on the skin, but usually pass into the fluids, as glanders and syphilis. 7. The course of contagious and miasmatico-contagious diseases is as follows: The parasite is taken up by the mucous membrane or injured skin; if the quantity taken up be small, then follows the stage of latent contagion, during which the parasite grows and multiplies. Neither does a skin parasite disappear in the blood, to be deposited afterwards on the skin, nor does a blood parasite remain inactive till the disease breaks out, (as people believe of hydrophobia). When the operation of the parasite is powerful (in the beginning of epidemics) death often occurs rapidly, and perhaps by sudden alteration of the blood, or by suffocation from irritation of the minutest bronchi.—The skin parasites cause mortification

or inflammation, the latter of which is more or less superficial, and appears as diffused hyperæmia or as an exanthema, according to the nature of the surface and the quantity of the exsudation. Inflammation propagates itself by continuity, partly by the increase of the parasites themselves, partly by sympathetic excitement. Only in glanders and syphilis does the contagion propagate itself by lymph and blood. The humoral pathology, which acknowledges only this last mode for the origin and spreading of contagion, overlooks the question, why the contagion should be deposited from the blood exactly at and near the points of inoculation. All diseases of the whole system, i. e. affections of the nervous centres, Henle considers to be the consequence either of local inflammation or of a change in the blood caused by the abstraction of nourishment from it, by the parasites which it contains. The development of contagion is dependent on the fixed stages of miasmatico-contagious disease, which again are chiefly the result of external and of accidental circumstances. Metastases are caused by the development of parasites and of exanthemata internally, under circumstances which are unfavorable to their development externally.

Supposing, however, that the hope of discovering parasites, i. e. fungi or infusoria, in the eruptions and the contagions of man may never be realized, yet the hypothesis of the parasitic theory, the assumption of an invisibly small organisation too minute to be distinguished from the animal elements, remains far better, than the assumption of a chemical substance, which is not indicated by any re-agent and cannot be analysed. The contagion of the parasitic theory is not indicated in every case, but it agrees in its operations with those of analogous bodies, and explains the symptoms of disease: the contagion of the chemical theory is nowhere indicated, it varies from all other known bodies in its supposed operation, and does not explain the phænomena of disease.

a. Pocks.—Schönlein agrees with those who consider the varioloids to be eruptions specifically different from real

small-pox: but Conradi and others have clearly proved by facts, that this is not the case. As to the question whether cow-pox is of the same origin as the small-pox of man, the results of Wedekind, Sunderland, Numann, and others, who tried to produce cow-pox by means of the atmospheric contagion of small-pox, are all contradictory. The identity of variola and of vaccine must, no doubt, be granted; but it is still doubtful, whether the pox in cows was at first and is still produced by contagion of small-pox only, or whether it can develop itself independently in the animals. By inoculating variolous matter into the udders of cows, Ceely and Thiele produced an eruption, which when inoculated back into men, appeared to be a powerful vaccine. Indeed the virus of small-pox may be altered to vaccine by inoculating with variolous lymph mixed in warm cow's milk, after it has lain for a few days between plates of glass secured by wax: if the experiment be continued, after the fifth reproduction, fever will cease to attend its inoculation; and after the tenth reproduction, we may inoculate in the ordinary way from arm to arm. Gruby has discovered microscopic beings in the papulæ and vesicles among the elements of the pus—pox-animalcules. They consist of a globular or conical body and a fine neck with a small hook, which they keep constantly moving, while they bend their neck backwards and forwards, and at times pull it back entirely. They are as large as molecular corpuscles, and Henle suspects that they are perhaps only such.—Sheep-pox. Several ewes in lamb were inoculated, almost all the fœtuses had pocks, and some of the sheep produced lambs covered with pocks: pox in sheep appears to have the same antipathy to the itch as human small-pox has.

b. Measles.—When Catona inoculated with the fluid of the vesicles of measles mixed with blood, or with the tears during the height of the eruption, the inoculation took effect in all but 7 out of 100 patients: a red ring formed round the point

of inoculation, which afterwards disappeared suddenly, and on the seventh or eighth day after the insertion of the virus, fever came on with the usual premonitory symptoms, and two or three days later the exanthema followed. In scarlet fever and in measles, Helfft declares that he has found the cells of the thrown-off epithelium of the mucous membrane, not only in the urine, but also in the excrement: according to him, the spreading of the exanthema, and the process of desquamation stand in inverse relation to the urinary and to the digestive organs. Sebastian observed the simultaneous and regular course of measles and vaccine in one individual, while in most cases the vaccine remains quiet till the measles have run their course.

c. Pemphigus.—Scharlau thinks, that he has proved by inoculation the contagiousness of this disease among new-born children.

d. Typhus.—In the two forms of disease which have been described under the names of typhus (*T. contagiosus exanthematicus, petechialis,)* and of typhoid fever, (*Fievre typhoide T. abdominalis,)* Davidson sees only two varieties of the same species. He endeavours to point out the analogy between typhus and other exanthematous diseases. According to Valleix, typhus is distinguished from similar and especially from typhoid diseases, by a characteristic eruption (numerous, irregularly grouped, roundish, dark red or violet spots, from the size of a pin head to that of a pea, not projecting, and not disappearing under the pressure of the finger, while in typhoid fever only a few, rare, coloured spots, slightly projecting, and readily yielding to the pressure of the finger appear in small number and only on the belly,—by the almost entire absence of affections of the higher senses—by the comparative slightness of the cerebral symptoms—by the absence of abdominal complications at the outset (ulcers of the bowels,) and by their small number and slight intensity. According to Valleix, typhus ought for the present to be reckoned among

essential fevers, since no constant local injury is found. Rochoux observed besides the petechiæ in typhus, a measle-like erratic exanthema in the form of scattered points always followed by desquamation: the exanthema of typhoid fever consists of small round elevations, which last for six or eight days. As an essential difference between typhus and typhoid fever he cites the propagation of the former by infection, which he positively denies to typhoid, (while Berland accords it.) Those who look on a primary alteration of the blood as the immediate cause of fever and of other exanthematous diseases, are supported by the results of the investigations of Andral and Gavarret. Winther deduces all the symptoms of typhus from fluidity and congestion of the blood. According to De Renzi, typhus-blood is very rich in blood corpuscles (generally without a nucleus) the colouring matter dissolved in serum, the placenta incomplete and soft; there is a deficiency of fibrine. Forget concludes from his researches—1, an appreciable alteration of the blood is not universal: 2, the blood seldom appears to be altered in the earliest stage: 3, the blood is the oftener found altered, the more advanced the disease is: 4, the degree of alteration, if there be any such thing, does not bear any definite relation to the period of the disease: 5, it is not coincident with the putrid and typhous symptoms, which may occur with or without it: 6, the different kinds of alteration do not appear to be connected with the fixed forms of the disease: 7, the degree of alteration is not in proportion to the intensity of the disease: 8, nor to the number of times that bleeding has been employed. As a cause of the slowness of hearing and of the deafness in typhus, Pappenheim discovered inflammation and suppuration in the mucous membrane of the drum of the ear. According to Engel the disappearance of a typhus epidemic may be predicated from the corpses: at the commencement, while it prevails strongly, we find the ulcers

almost solely in the stage of infiltration or of sloughing, before its disappearance open ulcerations and even scars are found. Dysentery is also an indication of the breaking up of a typhus epidemic. Vegetable parasites (minute fungi) have been observed by Langenbeck, Hannover and Bennett, in typhus patients and in their corpses.

e. Dysentery.—Rokitansky lays down four degrees or forms of the dysenteric process. 1. The first, is characterised by swelling, redness, and softening of the mucous coat of the large intestine, especially the folds of the mucous membrane, and by a serous exsudation in the form of a fine miliary vesicular growth, after which the epithelium desquamates in a clay-like state. 2. In the second degree, the mucous membrane is softened like a jelly, wart-like or fungous protuberances appear, which consist of serous inflammation of the submucous cellular tissue (according to Siebert, the formation of these protuberances commences with degeneration of the mucous glands, which grow black, and are surrounded with a chamois-yellow circle of the size of a lentil.) 3. In the third degree, the protuberances are more compressed, so that the inner surface of the bowel seems studded with large glands. The mucous membrane is in part converted into a black slough, or has disappeared entirely. 4. In the fourth stage, the mucous membrane has degenerated into a black, friable, as it were carbonised mass. The lymphatic glands of the mesocolon are in a marked degree swollen and injected, but without containing, as in typhus, a specific firm product. The dysenteric process always gradually increases in violence from the valve of the colon downwards towards the rectum. The true dysenteric process occurs, according to Rokitansky, also in the mucous membrane of the uterus, but only after delivery. Some chronic diseases, especially tubercular ones, seem to prevent the occurrence of dysentery; its predisposing causes are, mucous discharges from the bowels, gout,

rheumatism, hæmorrhoids, ague. Cruveilhier as well as R. have remarked the resemblance of dysenteric degeneration to the corrosion of mucous membranes by acids.

f. Aphthæ.—Taupin comprehends under the name of *stomatitis gangrænosa* pseudo-membranous and ulcerated aphthæ, and gangrene of the mouth: but it is only the first that can be epidemic or contagious. He considers the chief predisposing cause to be the impure damp air of hospitals; it belongs especially to the period of life between five and ten years of age. The degeneration commonly begins at the free edges of the gums, and seldom on the cheeks. Taupin, therein differing from Guersent, never found the mucous membrane sound under the slough, but always ulcerated. In these false membranes many observers have remarked minute fungi. Besides them other microscopic elements have been observed indicative of an inflammatory process; elementary granules, exsudatory corpuscles, inflammatory globules, and at a later period fibres standing together in groups, running into short points at both ends, with long drawn-out granules, which lengthen into indistinct fibres: between them, irregular masses of finely granulated or of fibrous substance—probably of fibrine.

g. Ophthalmias.—From the researches of Cederschjöld, a discharge from the generative organs of women appears to be one of the most frequent causes of *ophthalmia neonatorum*, since the proportion of children with diseased eyes to those with healthy ones, born of healthy mothers, is as 1 : 18; of those born of unhealthy mothers, as 1 : 7. The Egyptian or contagious ophthalmia is, according to Eble, on the whole identical in nature with catarrhal conjunctivitis: he declares for its primitive origin, and considers the most important cause of its production to be the congregating of too many people in a narrow space. As to contagiousness, he thinks that it is contagious to a limited extent, that infection

from a distance (i. e. by the air of a room filled with patients) is more common than from actual transference of the secretion; it is most frequent when the disease is violent and at its greatest height. Pieringer, in order to cure pannus, made many attempts to produce blennorrhœa by inoculation, and arrived at the following results. The contagion is fixed, its vehicle the mucus-like secretion of the conjunctiva: it is only in the second and third degrees of the disease that the mucus is positively infectious; as the secretion gets thinner, so does its infectiousness diminish: eyes already diseased are infected less easily than sound ones: the virus of the mucus is not preserved for more than three days after its removal from the body. The re-action from its introduction comes on in from six to twenty-four hours. The application of ice and the washing out the eye within three minutes after the introduction of the matter, protects against its action. Deconde, who says he has always produced in animals ophthalmia by introducing the matter of gonorrhœa, thinks that by injections of argent. nitr. into the urethra, the discharge immediately loses its contagious power. In like manner a solution of chloride of lime is stated to destroy the infectious power of the gonorrhœal secretion and of the mucus of contagious ophthalmia, but only if it be well mixed up with the secretion, or dropped in a few minutes after its introduction into the eye, not if it be dropped in before it.

h. Tinea.—In this disease, we need no longer talk of pustules, and least of all of pustules filled with matter, for the scabs are formed simply by the growth of fungi. Schönlein, Langenbeck and Fuchs discovered fungi in several species of *favus* and of *alphus*: Gruby has given a good account of these fungi, whose seat is the tissue of the epidermis. There is no doubt of the contagiousness of tinea, yet several unsuccessful attempts have been made to propagate it by inoculation of the fungi.

j. Itch.—It cannot be propagated by the inoculation of fluid matter from the itch pustules, any more than by its scabs.

k. Syphilis.—Ricord's results as to inoculation have been confirmed by several observers in the main points. Hauck rejects the designation of *fluor albus syphiliticus*, as leucorrhœa never produces syphilitic sores, if there be not at the same time syphilitic ulcers deep in the vagina or at the neck of the uterus. Castelnau, like Ricord, finds the ulcers of secondary syphilis not inoculable, but considers inoculation altogether to be an uncertain diagnostic sign, since even fresh chancres are not always to be propagated by inoculation. Donné's *Trichomonas vaginalis* was repeatedly found in the vagina of syphilitic patients by Henle, as were fungi in the mucous lining of the walls of the vagina.

l. Hydrophobia.—Breschet has ascertained, that the disease can be inoculated back to dogs, from men and other animals who have got the disease by the bite of mad dogs, not spontaneously. He thinks also, that he has observed that the poison loses much of its strength in the third and fourth generation. The consequences of infection usually display themselves between the 20th and the 30th day after the bite, at times not till after three months. It would also appear, that the poison is present in the blood, even during the latent stage of the contagion, for two ewes that had been bitten, gave suck to their lambs for fourteen days after it had happened, and four weeks afterwards the ewes became mad, and were followed by the lambs nine or ten days after.

**m. Disease of jaws and hoofs in cattle.*—Although the actual contagiousness of this disease has not been proved by inoculating back from man to animals, yet repeated experiments prove the injuriousness of eating milk, butter or cheese

* ☞ See note at p. 250.

procured from cows affected by this disease. It produces a phlyctœnulous pustular eruption round the mouth, and ulcers inside it, colic and diarrhœa, and at times eruptions on the hands and feet. Almost all calves suckled by diseased cows died of diarrhœa. Touching the diseased secretion, produces, according to Siebert, an *erysipelas bullosum* at the point of contact.

**n. Lung disease of cows*—(contagious pleuro-pneumonia). It is contagious, as Hertwig proved it to be, who produced it by inoculation with blood and with the secretion of the nose, as also by mere juxta-position with healthy cows.

**o. Gangrene of the spleen.*—There are still disputes whether the eating of the flesh of an animal suffering from this disease is infectious, but there is no doubt of its general contagiousness.

p. Glanders.—Its contagiousness, at least in the acute form, is generally acknowledged: views are more discordant regarding the chronic one. Magendie goes the length of considering the two distinct, and does not consider the chronic form to be infectious. Hering proves, that chronic glanders communicated from a horse to a donkey usually runs a very acute course. In the way of experiment it has been undoubtedly proved, that glanders can pass from horses to other animals of different genera, although the action of the poison inoculated is slower and less certain, than in the solid unguli. Cases of the accidental infection of men have also been observed, and Rayer has introduced glanders into his system of pathology. The local symptoms are a kind of carbuncle, along with the well known affections of the lymphatic glands: if the disease becomes universal, then it resembles a good deal the so-named reabsorption of pus. Glanders in man can be inocu-

* *m, n, o.* The translator is not acquainted with the English synonyms for these names.—*Tr.*

lated back to animals. As to the nature of the contagion, some facts lead to the suspicion, that it may be caused by a vegetable parasite. Langenbeck observed a filiformi fungus in the discharge from the nose of a horse sick of glanders.

NOTE.—We thought at first of adding notes, and of making some remarks on this translation; but it is so condensed, and contains so much matter on so great a variety of subjects, that the task of annotation would have been unsatisfactory as well as laborious. We have preferred giving it without comment, as a good exposition of the most modern continental views on many interesting points in medicine, and more especially of the opinions of what may be termed the natural-historical school. We shall merely remark, that few practical men have any faith in Liebig's plausible theoretical views regarding disease and the action of remedies; indeed he has damaged himself by the extremely confident way in which he has applied his theories to sciences with which he was imperfectly acquainted. Nevertheless we hope soon to have an opportunity of giving a more detailed account of his views, than this paper affords, and also to indicate from time to time the most recent opinions in physiological medicine, which has of late acquired a degree of interest and of consequence, never before possessed by it. As to the parasitic theory, it deserves at least the praise of much ingenuity.—J. M. P.

A few remarks on the Diseases of Seamen in the year 1844.

By JOHN MACPHERSON, M. D.

The following table of cases treated in the Howrah Hospital, exhibits a fair view of the diseases most common among the seamen frequenting this port. On a general survey of it, it is apparent that cholera and dysentery are the two most fatal diseases. Fever, generally of a remittent type, is the most common complaint, and at times adds largely to the

mortality, though it has not done so of late. Hepatitis is by no means so common, as many suppose. The rareness of primary affection of the organs of respiration and of circulation is remarkable, as also the infrequency of acute rheumatism, considering the great changes of temperature to which seamen are exposed. Syphilis is usually very mild, and scurvy is very rare, and commonly slight. We believe that there are no means of ascertaining with any approach to accuracy, what the actual loss of life among Europeans visiting this port may be: but it is undoubtedly much greater than is ordinarily supposed; nor shall we wonder at this, when we consider the reckless habits of sailors, the loaded state of their bowels so frequent after a long voyage, their sudden and excessive indulgence in unripe fruit and poisonous spirits. on arriving in the river; their frequently having to work under a midday sun, their wandering through the bazars in the day-time, their indulgence in every species of excess on shore, and their returning on board at night to lie on a damp deck, deterred by its closeness from entering the forecastle:—add to this, the sudden changes of temperature (at times amounting in the course of a short north-wester, to 10° Fahrenheit,) and that at some seasons many vessels lie in shore exposed to the most nauseous effluvia from the mouths of sewers; and we shall not be surprised at the production of disease.

We wish that we could say that, when produced, it was promptly treated; but it is unnecessary here to enter upon that ungrateful subject.

In comparing the proportion of deaths to admissions, it is to be remembered that the cases are always more advanced, and usually more severe, than those admitted into military hospitals.

Return of cases of Seamen treated in the Howrah Hospital in 1844.

	Jan. 1st, 1844, Remained.	Admitted.	Total.	Relieved or cured.	Died.	Transferred.	Remained, Dec. 31st, 1844.
Fever,	0	127	127	126	0	0	1
Spleen,	0	1	1	1	0	0	0
Small-pox,	0	4	4	2	2	0	0
Cholera,	0	17	17	7	10	0	0
Dysentery,	0	29	29	23	4	1	1
Diarrhœa,	0	10	10	10	0	0	0
Dyspepsia,	0	7	7	7	0	0	0
Obstipatio,	0	3	3	3	0	0	0
Colica,	0	0	0	6	0	0	0
Inflammation of bowels,	0	2	2	2	0	0	0
Worms,	0	2	2	2	0	0	0
Hæmorrhoids,	0	2	2	2	0	0	0
Hepatitis,	0	9	9	9	0	0	0
Jaundice,	0	2	2	2	0	0	0
Excess,	0	13	13	13	0	0	0
Delirum-tremens,	0	7	7	7	0	0	0
Cephalalgia,	0	13	13	13	0	0	0
Coup de Soleil,	0	1	1	1	0	0	0
Apoplexy,	0	1	1	0	1	0	0
Epilepsy,	0	3	3	3	0	0	0
Dementia,	0	1	1	0	0	0	1
Heart disease,	0	2	2	2	0	0	0
Lung affections,	0	6	6	6	0	0	0
Rheumatism,	0	13	13	12	0	0	1
Scurvy,	0	5	5	4	0	0	1
Cachexia,	0	1	1	0	0	0	0
Syphilis,	0	38	38	35	0	0	3
Stricture,	0	1	1	1	0	0	0
Cutaneous diseases,	0	4	4	3	1	0	1
Concussion,	0	1	1	0	0	0	0
Contusions and Sprains,	0	10	10	10	0	0	0
Fractures,	0	1	1	1	0	0	0
Wounds,	0	2	2	2	0	0	0
Musquito-bites,	0	7	7	6	0	0	1
Scalds,	0	2	2	2	0	0	0
Ulcers,	0	5	5	5	0	0	0
Boils,	0	2	2	2	0	0	0
Abscess,	1	0	1	0	1	0	0
Inflammation of leg,	0	1	1	1	0	0	0
Inflammation of periosteum,	0	3	3	3	0	0	0
Inflammation of eye,	0	3	3	3	0	0	0
Odontalgia,	0	2	2	2	0	0	0
Otalgia,	0	1	1	1	0	0	0
Total,	1	370	371	341	19	1	10

Mortality:—Fever 0; Small-pox 50 per cent.; Cholera 60 do ; Dysentery 14 do. On whole 5.2.

Table shewing the relative proportion of cases of Fever, Cholera, Dysentery, and Hepatitis among Seamen in 1844.

	Fever,	Deaths.	Cholera,	Deaths.	Dysentery,	Deaths.	Hepatitis,	Deaths.
January,	4	0	1	1	0	0	0	0
February,	1	0	0	0	1	0	0	0
March,	7	0	1	1	3	0	0	0
April,	0	0	13	8	5	0	1	0
May,	3	0	0	0	2	0	1	0
June,	6	0	1	0	1	0	1	0
July,	5	0	0	0	7	2	1	0
August,	24	0	0	0	4	2	2	0
September,	25	0	0	0	1	0	1	0
October,	10	0	0	0	3	0	1	0
November,	35	0	0	0	1	0	0	0
December,	7	0	1	0	1	0	1	0
Total,	127	0	17	10	29	4	9	0

N. B.—This table indicates only the *relative* diffusion of diseases, i. e. their proportion to each other during the month. In April, when cholera was epidemic, no fever case was admitted. In July and August, Dysentery was most prevalent, and most fatal.

Table shewing the ages of patients.

14 and under 20,	75
20 and under 30,	181
30 and under 40,	79
40 and under 50,	28
50 up to 56,	8
Total	371

Remarks.—110 more seamen were admitted in 1844 than in 1843. The general mortality of 1843 was 7.7 per cent.—of 1844, 5.2.

Fevers.—It is exceedingly difficult to make the common division of fever into continued and remittent, in any satisfactory way, and it has not here been attempted.

The fevers of 1844 were generally of the common Bengal remittent type, in nine cases out of ten with cerebral congestion, and of a mild character, as might have been presumed from the fact, of no fatal case having occurred during the year. As far as treatment can be supposed to have been influential in producing the small mortality in 1843,

1.7 per cent., and the absence of fatal cases in 1844, the favourable results are attributable to the very sparing way in which general blood-letting was practised, to the free use of local bleeding and blistering, and to the early exhibition of quinine.* In October and November there was a good deal of gastric irritability, and the acuteness of pain in the loins complained of by the patients was unusually great. In one instance, after a slight attack of remittent fever, the spleen was affected, but it was found that the patient had formerly suffered from ague at Gravesend. Intermittent fever, as has been remarked by others, appears to be unusual among the seamen frequenting this port.

Small-pox.—A few cases were admitted, when this disease was so prevalent in the earlier part of the year: all the men had been vaccinated when children, yet it will be seen that the proportional mortality was very great. Though it did not occur in a hospital patient, it may not be out of place to mention here a curious fact which fell under my notice in a private patient. There was a single well-marked small-pox pustule fully developed on the hand, at the time when the premonitory fever commenced, and before there was a trace of any eruption elsewhere.

Cholera.—It is a very rare thing to have an opportunity of treating this disease in its earlier stage. A sailor usually lies on the damp deck for some hours during the night, before his comrades are aware of his illness; and then a few more hours are lost by the miserable system of sending for the doctor who has contracted to attend the ship. When a man is really dying, it is thought time to send him ashore. Of the ten fatal cases, seven died within nine hours after admission. In one instance, the exciting cause appeared to have been the drinking two table spoonsful of cream of tartar in water; in another, the exhibition of an emetic on board ship. No satis-

* The character of the fevers must have altered much, for the mortality for the four years ending with 1840, averaged 8 per cent. per annum.

factory report can be given of any mode of treatment adopted in this hospital. The hot-bath system has been tried pretty extensively within the last two years, chiefly in cases in a state of collapse, but it was only in one instance that it appeared to be of decided benefit, and in that case it is difficult to determine how much was due to the other remedies employed. There were two cases, which exhibited well the low typhoid symptoms which frequently follow the acute stage of cholera. In the first case, the efforts of the system were able, after a long struggle, to produce a healthy re-action; in the second they proved inadequate. An account of the last is subjoined.*

	Diet.	
April 10th.—G. MANSHIP: ætat 34. Had cholera three days ago, from which he is recovering slowly. Tongue furred and brown, a good deal of thirst: motions frequent and watery: cuticle raised from the abdomen, which is raw. Pulse very weak.		*R.* Pil. Plumbi Acet. c. Opio. Duo s. s Inject. Opiat.
11th.—Has had constant vomiting during the night, of greenish fluid; has passed copious fluid stools, chiefly of bile: complains only of weakness and of vomiting.	Sago and brandy.	*11th.*—Haust. Acid. Hydrocyanic. dil. Prore nata repet. Merid. *R.* Pil. Hydrarg. Ext. Hyosc. *aa* grs v. Ter in horis.
Vesper.—Has only vomited twice since the morning: is excessively languid, with some congestion of the head.		*Vesper.*—Applic. Empl. Lyttæ Nuchæ.
12th.—Has still bilious diarrhœa: no vomiting.		*12th.*—P.
Vesp.—No purging since morning: in the same languid state: some vomiting of green fluid.		
13th.—Passed an immense quantity of bilious-looking stools: is excessively exhausted, with some difficulty of breathing: no vomiting. Tongue cleaner.		*13th.*—Mistura Cretæ, cum Tinct. Kino, post singulas dejectiones.
Vesp.—Vomiting and purging both stopped: excessively languid.		Haust Ammon. et Spir. Æther. Nitr. 2 dis horis.
14th.—Had only one motion last night: voice stronger.		*14th.*—Rept. Mist. Cretæ prore nata et pil. h. s.
Vesp.—No vomiting: has had one stool: improving.	Sago.	
15th.—Stationary.		*15th, Vesp.*—Applic. Empl. Lyttæ.
Vesp.—Has some cough, and great difficulty of respiration.		Repet. pil. h. s.

* We have been informed that after the appearance of a few cases of cholera on board ship, the practice of keeping the ports facing the east always shut, was adopted, and no more cases occurred.

	Diet.	
16*th.*—Chest relieved: tongue white, and coated.	Lemonade.	16*th.*—Repet pil. h. s.
17*th.*—In the same languid state. motions scanty and dark.	Low diet.	17*th.*—*R.* Ol. Ricini, ℥ vi. Tinct. Opii, ♏ xv.
Vesp.—Ditto: motions more natural.	Soda-water 3 bottles.	*Vesp.*—Repet pil. h. s.
18*th.*—Complains only of languor and thirst: is slowly convalescent.		18*th.*—Infusi Gentian. haust bis in die s.
		Vesp —Rept. pil. h. s.
19*th.*—Ditto · heaviness about his head.		19*th* —Applic. hirud viii. temps.
Vesp.—Head slightly relieved, but excessively weak · pulse quick: skin feverish. motions yellow and watery: sore of the blister on the abdomen large and painful.		Radatur cæsaries.
		Vesp.—Repet pil., h. s.
20*th* —Feverish symptoms abating.		20*th.*—Haust efferv. ter in die.
22*nd* Gradually improving; but from excessive debility has sores on his hips: his face covered with spots of a flat pustular eruption, with an inflamed border.	Half diet Wine 3	22*nd.*—P. Haust. Quinæ, ter in die.
23*rd.*—Exceedingly low, and more of the ruppia-looking spots out: the sores and the eruption are so painful as to prevent his getting any rest.		23*rd.*—*R.* Tinct. Opii, ♏ l. h. s. s
25*th.*—Improves on the whole; but is covered from head to foot with boils		25*th.*—P.
28*th.*—Many of the boils have ulcerated, and form nasty deep sores.		26*th*—Ol. Ricini, ℥vi.
		Applic. Lotio Cupri Sulphat.
30*th.*—Excessively weak sores spreading, but not unhealthy.	Beer pints.	30*th* —P.
May 4*th.*—Improves a little, complains of debility. Motions healthy.		*May* 4*th.*—Pergat. in usum Quinæ.
9*th.*—Sores gradually improving, but he continues exceedingly low. tongue dry in the morning.		9*th Vesp.*—Omittr. Haust. Quinæ.
Vesp.—Has some fever. tongue brown and dry.		*R.* Hydrarg. Chlorid Pulv. Antim. *aa* grs. iij. h. s.
11*th.*—Sores healing, but continues in a low state resembling typhus.		11*th.*—Liquor. Ammon. Acetat. Misturæ Camphoræ, *aa*. ℥i. Ter in die Repet Pulv h. s.
12*th.*—Remains excessively low, and his head has been wandering much.	Omit extras.	12*th.*—P.
		Applic. Empl. Lyttæ Nuchæ.
13*th.*—As yesterday, complains of nothing, but is quite delirious.		13*th* —Infric. Unguent. Hydrarg.
		Vesp.—Hydrarg Chlorid. grs. v.—h. s.
14*th.*—Continues in a state of low delirium: symptoms of effusion within the cranium: the second blister applied to the head rose well.		14*th* —P. et Hydr. chlorid. grs. iij. Tertia horis.
Vesp.—Lower: moribund.		
15*th.*—Less jactitation. and appears rather more sensible: gums not affected: had three glasses of wine.		15*th.*—P.
Vesp.—Worse and lower: died in the night.		

Sect. Cadav.—Viscera all quite healthy: no trace of disease *Brain remarkably firm.*

Remarks.—Manship was thus admitted on the 10th April, suffering from bilious diarrhœa. On the 11th, his head was congested: on the 15th, there was congestion in the thorax; 19th, the head again became affected, along with febrile symptoms: 22nd, the system began to throw out boils, which kept him low and weak. May 9th, symptoms resembling typhus supervened, under which he succumbed on the 15th. There was no effusion within the cranium, though the symptoms during life seemed to indicate it. The firmness of the cerebral substance was, I fancy, what some authors have described, as hardening of the brain after typhus.

Dysentery.—The worst and most fatal cases of this disease were all admitted from one ship in dock, which had a particularly debauched crew. As the incipient stage is usually past before men are sent to hospital, general depletion and the means commonly employed to check the onset of the attack, are frequently inapplicable. Indeed, as dysentery is essentially an inflammation of a mucous not of a serous surface, it may be doubtful whether local be not often as effectual as general depletion. As to the use of calomel, which is so commonly employed at its onset, the general feeling of the profession seems to be against its employment at a later stage*, and indeed it is difficult to conceive what beneficial influence it can exert on an ulcerated surface.

Accordingly the usual treatment in the Seaman's Hospital is the free exhibition of sugar of lead and opium, and it appears to answer well. As much as from nine to fifteen grains of sugar of lead, combined with small quantities of opium, (one or one-half grain of opium to three of sugar of lead) are given within the twenty-four hours; and this treatment is continued for several days, along with the free use of leeches and opiate and sugar of lead enemata, with purgatives every other morning, and milk diet. Perhaps in no disease is it more important, that the patient should not remain on board ship, where his diet is sure to be neglected, and in none is attention to it so imperatively demanded. Indeed, such is the value of milk diet, that we can readily believe that the albumen of eggs, of late years confidently brought forward by writers both in France and in Germany as a cure for it, may be a

* See a practical paper of Dr. Goodeve's in the Transactions of the Medical and Physical Society.

very useful adjuvant in the milder forms of the disease which prevail in some parts of Europe.

But to return to the sugar of lead treatment, it is unnecessary to enquire here, what shares the opium and the lead relatively bear in the curative process; but that the sugar of lead plays an important part we have no doubt, and we have employed it combined with hyoscyamus very advantageously in some chronic cases. This mode of treatment has been tried very extensively among natives, and appeared to be very efficacious, and convenient, as avoiding the chance of salivation. It would seem to be particularly adapted to that insidious form of hæmorrhagic dysentery, of which several cases have of late occurred in middle aged men, characterised by the pouring out of immense quantities of blood from the mucous surfaces, indeed compared by some to flooding in child-birth, but of which no well marked case has occurred in the Howrah Seaman's Hospital.*

We have written at this length about sugar of lead, not as advocating any exclusive mode of treatment, or meaning to assert its superiority over that most admirable remedy, sulphate of copper, or over various others; but having lately met with a paper, in which, owing to its alleged bad effects when given in small quantity in a single case, its total disuse was recommended, we thought it as well to record that we have used it in large doses in some 300 cases both in Europeans and in Natives, without any of those disagreeable constitutional effects which are attributed to its employment.

Of course after the dysenteric symptoms have begun to subside, various alteratives are useful in aiding the bowels to

* There is no distinct account of this form of dysentery in Raleigh's book: his hæmorrhagic form being quite different. Twining describes it, but does not seem to regard it as the consequence of chronic disease. Several cases of it were related to me by the late Dr. Garden, who has so recently been removed from us, when at the height of professional eminence in Calcutta. Strong sense, high principle, never-tiring, ever-zealous friendship, were some traits of a character, which was most esteemed, where best known.

regain their healthy tone. Scybala, or hardened fæces, are hardly ever met with, and in the course of 1843 and 1844 no hepatic complications were observed.

An abstract is given of the post-mortem appearances in two cases, which differ a good deal from those usually met with. In the first, the small amount of disease in the colon was remarkable; in the second, the small intestines and stomach were partially involved.

J. J——, Ætat 16, *died after eight days' illness. Sect. cadaver.*

The small intestines and the colon, externally healthy and pale: very slight inflammation of the mucous coat of the transverse colon, which contained a lumbricus, *but showed no tendency to ulceration:* from the descending colon along the sigmoid flexure to the end of the rectum, the intestine was one mass of thickening and ulceration, in many places yielding to the finger. Liver healthy.

J. L——, Ætat 25, *died after eleven days' illness. Sect. cadaver.*

Colon enormously distended with flatus, and concealing from view the other viscera; its inner coat and that of the cœcum studded throughout their whole extent with thick-set deep ulcers, which had in some instances almost penetrated their walls: small intestines in many spots inflamed externally, and with some lymph effused on their surface: healthy internally. Stomach small and shrivelled up, with patches of red, but no ulceration on its mucous surface. Liver sound.

Hepatitis.—The cases among seamen were all either chronic or sub-acute, and easily relieved. An iron-founder was admitted into hospital, who had burst an abscess of the liver into his lungs, while he was at work, at which he continued for some days after that occurrence. He died about six weeks after with all the symptoms of phthisis, and on post mortem examination his right lung was found completely disorganised, and on the superior surface of the right lobe of the liver were the remains of a superficial abscess which was rapidly healing, having a base about the size of a crown

piece. The rest of the liver and the remaining viscera were quite healthy. No doubt had his lungs been stronger, he would have recovered; though no tubercles were observed, yet he was of a well marked strumous diathesis.

Cephalalgia.—Several of these cases were merely incipient fevers, and were checked by the ordinary means. Some allusion was made in the H. S. Hospital report for 1843,* to several obscure cases of cerebral mischief. The following case is a specimen of them: they are of a very puzzling character, and seem to resemble the earlier stage of the cases of disorganisation of the brain, recorded by Dr. Green in his Hospital reports.

	Diet.	
J. Turner.		
Aug. 12*th*—Pale and worn-out looking. has been subject to severe headaches for the last two months, and has been bled three times for them: first attacked on coast of Africa fifteen months ago: general health good. Pulse natural: never received a blow on his head.		*Aug.* 12*th*.—Hirud. xvi. temps. Pil Calom. *c* Coloc., h. s.
		13*th*.—Haust. Purgans.
		Vesp.—Pil. Hydrarg. Ext. Hyosc. *aa* grs. v., h. s.
14*th*.—Head much relieved, but has still constant beating pain in it.	Low.	14*th*.—Empl. Lyttæ nuchæ.
		15*th*.—Haust. Purgans.
17*th*—Head rather better.		16*th*—Applic. Empl. Lyttæ capiti.
18*th*.—Complains of pain and constant beating on the top of his head.		18*th*.—Haust. Purgans.
20*th*—More swimming in his head.		20*th*—Seton. Pil. Calom. *c* Coloc., ℔ s.
		21*st*—Pil. Calom. c. Opio, bis in die.
25*th*.—Salivated, but no material change in his head: seton discharges freely.		25*th*.—Pil. Hydrarg. Pil. Rhei, *aa* grs. v., o. n.
28*th*—No change.		
29*th*.—Mouth continues sore.		28*th*.—Ol. Ricini, ℥i. repet. pil. altern noct.
		29*th*—Omitt pil. h. s.
		13*th*.—Repet. Ol Ricini.
		R. Potass. Iodid. grs. ijj. bis in die.
Sept. 14*th*—In the same state: mouth well.	Low.	14*th*, *Vesp*—Hirud. xiv. temps.
15*th*.—Complains of having had violent beating in his head last night.	Spoon.	
16*th*.—Had last night one of the fits of which he complains; in them his head becomes quite giddy, and there is violent pain: no convulsions or falling down, during the fit. Pulse slow.		16*th*.—Haust. Purgans. P. Rad. Capill. Empl. Lyttæ capiti.
17*th*—Slept better: bowels costive.		17*th*.—Pulv. Jalap *c* ℥i. s. s.
		18*th*.—P. in usum Potass. Iodid.
19*th*.—Head continues the same, complains of faintness and difficulty of breathing.		19*th*.—Antimon. Potass. Tart. gr. ¼ quater in die. Omitt Alia.

* In Dr. Finch's Journal.

	Diet.	
22*nd.*—Better: bowels costive.		22*nd.*—Haust. Purgans.
26*th.*—Has been better under the use of nauseating medicine till to-day, when his head is worse.		*Vesp.*—Pulv. Ipecac. P. Digital *aa* grs. iii., h. s.
Vesp.—Has fever: temples throbbing		26*th*—Hirud. vi. temps. P. *Vesp*—Hirud. xii. capiti. Pil. Calom. *c* Coloc.
27*th*—Less heat of head. tongue coated.		27*th.*—Haust. Purgans. Mist Salin.
		Vesp.—Pil. Hydrarg Extr. Hyosc *aa* grs. v., h. s.
28*th.*—Ditto.		28*th*—Pulv. Jalap. Co ʒi.
Merid. Much worse, with pain in head, and difficulty of breathing. Great oppression at the præcordia		Infric Unguent. Antimon. Merid. Hirud. xvi. temps. *Vesp.*—Empl. Lyttæ capiti; Hydr. chlorid gr. iv. tertiis horis.—V. S. ad ʒ xvi
29*th.*—Head better, and pulse quieter; but complains much of difficulty of breathing: tongue loaded: bowels open. Coagulum soft, still some difficulty of breathing.		29*th.*—Vini Ipecac. Tinct. Hyosc. Spirit. Ammon. Aromat. *aa* ʒss. Mist. Camphor. ʒxij. M. ft. Mistura, &c.
Vesp.—Difficulty of breathing relieved: skin and head still rather hot: bowels not open. Tongue dark and coated.		*Vesp.*—Enema purgans. Pil. Hydrarg, Extr. Hyosc *aa* grs. v., h s.
30*th.*—Pulse quiet: skin cool. bowels only open once.		30*th.*—Pulv. Jalap. *c* ʒi. s.s. Repet pil. Calom. *c* Coloc., h. s Enema purgans
Oct. 1*st.*—Vomiting came on last night, and he has complained of constant sickness since. Tongue thickly coated: bowels not open: pulse quiet. no heat of head: cramps in legs.		1*st.*—Ol. Tigl. ♏iii., s. s. Sinapism abdom. Pil. Hydrarg. Extr. Hyosc. *aa* grs. v., h.s.
2*nd.*—Symptoms again relieved, but his head has been wandering a good deal for a day or two; cannot sleep.	Spoon.	2*nd.*—Tinct. Hyoscyam. ♏xl. Mist. Camphor. ʒiss., s.s.
Vesp.—Very restless.		*Vesp.*—Morphia Acet. gr. i. h. s.
3*rd.*—Slept well last night, and is cool this morning. Tongue remains much coated.	Milk.	3*rd.*—Haust. efferv. ter in die.
		Vesp.—Morphia Acet gr. ss. h. s.
4*th.*—Tongue much cleaner, the same otherwise.	Half.	4*th*:—Omitt. Medic.
13*th.*—Has been much better since the weather has been cooler.		
20*th.*—Improves gradually. Ship going, discharged.		

Remarks.—The bowels were throughout excessively costive: local applications seemed at first to give temporary relief. Putting him under the influence of mercury, did no good, nor did the seton. The iodine was not continued long enough to be of any use, as it seemed to disagree with him. No satisfactory reason can be assigned for his getting so much worse from the 26th to the 3rd. The morphia operated very favourably in quieting his incessant restlessness. The symptoms will no doubt all return.

Apoplexy.—The patient was admitted insensible, and died in half an hour. Post-mortem examination shewed only enlargement of the liver, which was of a light colour and fatty. There was nothing in any degree abnormal in the contents of the cranium.

Rheumatism.—The cases were chiefly chronic and articular; one was gonorrhœal, and another was accompanied with secondary symptoms.

Abscess.—The fatal case was a huge deep-seated abscess in the thigh of a boy convalescent from fever, which had separated all the muscles from their attachments to the femur. There was considerable difficulty in getting at the seat of the abscess, and on its contents being evacuated, he sank.

Inflammation of the eye.—The cases were, one of ordinary conjunctivitis, one of syphilitic iritis, which came on six weeks after a trifling sore on the prepuce had been healed, and one of concussion of the globe with extravasation of blood into its chambers, from a bottle being thrown at the head. Though there is now no difference in the appearance of the two eyes, save a slight irregularity of the iris, all useful vision is destroyed.

Lumbrici are common in seamen, but they do not appear to be more frequent in diseases of the digestive organs, than of others.

March 22nd, 1845.

Report on the Collection of Fossils from Southern India, presented by C. J. Kaye, *Esq.*, F.G.S., *and the* Rev. W. H. Egerton, F.G.S. *By Professor* Edward Forbes, F.L.S.

(From the Quarterly Journal of the Geological Society, No. 1.)

In the descriptive catalogue accompanying this report, and referring to the remains of invertebrate animals in the valuable collection of fossils from the South of India, presented to the Society by Mr. Kaye, and increased by an extensive series of specimens collected in the same localities by Mr. Egerton, 168 species of Mollusca are enumerated, 156 of which, as far as can be ascertained, are undescribed forms. There are also a number of species of Radiata.

The results of their examination may be briefly stated as follows :—

1st. The three deposits, viz. Pondicherry, Verdachellum, and Trinconopoly, described by Mr. Kaye, are *Cretaceous*, inasmuch as there are characteristic known cretaceous fossils in the collections from all of them, whilst no fossils of any other system occur. The nearest allies of the majority of the new species are cretaceous; and among the genera and subgenera are many which, as far as we know, are confined to or have their chief development in the cretaceous system. The three deposits are connected with each other zoologically by the associations of certain species common to two of them, with others found in the third.

2nd. Two of the three deposits, viz. Verdachellum and Trinconopoly, are of a different epoch of the Cretaceous era from the third, Pondicherry. The two former have several species in common (and those species among the most prolific in individuals), which are not found in the third. In them are found almost all the species identical with European forms. In several of the genera, of which there are many species, the forms are altogether distinct; although, judging from the evidence afforded by mineral character and association of species, the conditions of depth and sea-bottom at the time of the deposition of the strata seem to have been the same. The difference therefore must have depended on a representation of species by species *in time* and not *in depth*.

3rd. The beds, apparently contemporaneous, viz. Trinconopoly and Verdachellum, may be regarded as equivalent to the upper green sand and gault; the European species they include being either characteristic upper green sand and gault forms, or else such as occur in those strata. The new species they contain are either closely allied to known upper green sand or gault species, or peculiar to the Indian beds.

4th. The Pondicherry deposit may be regarded as belonging to the lowest part of the Cretaceous system. In it almost all the fossils are new. Such as are analogous to known species are allied to fossils of the lower green sand of English geologists and Neocomien of the French. In the genus most developed in this deposit, viz Ammonites, three-fourths of the species belong to those subgenera especially characteristic of the "Lower Neocomen" of the Mediterranean basin; whilst, of the remainder, as many representatives of

Oolitic fossils occur as of upper green sand. The resemblance between the Ammonites of this part of the collection and those of Castellane, in the south of France, is very remarkable, though the specific identity of any of them is doubtful. Having seen no account of the Conchifera of the Castellane beds, I cannot say how far the analogy is borne out among the bivalve Mollusca among the Indian species, of which there are many very peculiar forms.

5th. Considered in regard to the distribution of animal life during the Cretaceous era, this collection is of the highest interest. It shows, that during two successive stages of that era the climatal influence, as affecting marine animals, did not vary in intensity in the Indian, European, and American regions, whilst the later of the two had specific relations with the seas of Europe, which are absent from the earlier. The cause of this remarkable fact is not to be sought for in a more general distribution of animal life at one time than at another, but rather in some great change in the distribution of land and sea, and in a greater connection of the Indian and European seas during the epoch of the deposition of the upper greensand, than during that of the lower. To this cause must also be attributed the peculiar tertiary aspect of the Indian collections, depending on the presence of a number of forms usually regarded as characteristic of tertiary formations, such as Cypræa, Oliva, Triton, Pyrula, Nerita, and numerous species of Voluta, the inference from which, since not one of the species is identical with any known tertiary form, should not be that the deposits containing them are either tertiary or necessarily connected with tertiary, but that the genera in question commenced their appearance earliest in the Eastern seas, which, when we recollect that in those very seas at the present day, are found the great specific assemblages or capitals of those genera, whilst they have either disappeared or have few representatives in the seas of other geographical regions, is exactly what we should expect, *à priori*, to find. This fact would go far to support the theory, that genera, like species, have geographical birth-places as well as geographical capitals.

The fact, that of the few species found in the Indian cretaceous beds which are common to the same beds in distant regions, the majority are such as range through several deposits of different ages, supports the probability of a law which I have elsewhere indicated,

viz. that *the range of the geographical distribution of species is usually correspondent to the range of their distribution in time.*

The probability of the proposed law, that the *marine faunas of distant localities, under similar conditions of climate, depth, and sea-bottom, maintain their relations rather by the representation of forms by similar forms, than by identity of species, is also borne out by the examination of these collections.*

These inferences can be only put forth as provisional, until a thorough examination of the deposits described by Mr. Kaye in their stratigraphical relations be made, and the fossils of those localities which he did not visit have been still further examined on the spot. To the palæontologist his collections are invaluable, as the specimens are in so fine a state of preservation, as to permit of an examination of their minute structure.

The descriptions of fifteen of the Trinconopoly species in the catalogues were furnished to Mr. Kaye by Mr. George Sowerby.

[*Note.*—With regard to this report, it was also intended that it should have been accompanied by a descriptive catalogue of the fossils, and by figures of new species, and it is in so far, therefore, incomplete. It is published in this place as an indication of the important results actually arrived at by the study of these interesting fossils.—Ed.]

On the Permian System as developed in Russia and other parts of Europe. By Roderick Impey Murchison, *Esq., F.G.S., V.P.R.S., and* M. E. de Verneuil, *Hon. Mem. Geo. Soc. of London.*

(From the Quarterly Journal of the Geological Society, No. 1.)

On the part of his associates, M. de Verneuil and Count Keyserling, and himself, Mr. Murchison has previously explained in the Proceedings of the Geological Society the nature of the various deposits which constitute the subsoil of European Russia. As in all other parts of the world which have been adequately examined, the Silurian rocks are those which contain the earliest forms of animal life, and in Russia they are overlaid by Devonian and carboniferous deposits, each of which is there singularly well defined by its organic remains and regular superposition.

In common with many other geologists, Mr. Murchison was formerly of opinion* that the above-mentioned three systems constituted the whole Palæozoic series, but the examination of Russia and Germany has led him to include also therein the next group in ascending order, or that to which he had assigned† the name of Permian.

When two or more conterminous formations are shown to have a community of fossils, it has recently been deemed essential to group them under one name; and following the practice of assigning to any such newly classed group a geographical name derived from the region where the strata are best developed, the term "Permian" was employed. This system was first proposed to embrace the deposits known in Germany as the Rothe-todte-liegende, Zechstein, Kupferschiefer, &c., and in England as Lower New Red Sandstone, Magnesian limestone, &c.

In communicating some of the results of a journey in Poland and Germany during last summer, Mr. Murchison, one of the authors of the present memoirs, states that his object is to show that his first view concerning the inferior limit of this system is correct—to extend its upper limits, and from the distribution and character of its organic remains to demonstrate that it is of palæozoic age.

Near Zwickau in Saxony, and Waldenburg in Upper Silesia, productive coal-fields (in the latter country recumbent on carboniferous limestone) are unconformably surmounted by red conglomerate, sandstone and shale (the rothe-todte-liengende), which in those countries, as in Thuringia and Hesse Cassel, pass conformably upwards into Zechstein or its equivalents. The same relation of a lower sandstone to the Magnesian limestone are, indeed, well known in England, and have been pointed out in detail by Professor Sedgwick. Seeing that these two deposits are so intimately associated, few, if any, geologists would wish to disunite them; but the question arises, what is the uppermost limit of this group. In Russia,

* See "Silurian System," p. 46. *et seq.* In England Professor Phillips has, however, some time maintained that the fossils of the magnesian limestone ought to be grouped with the inferior strata.

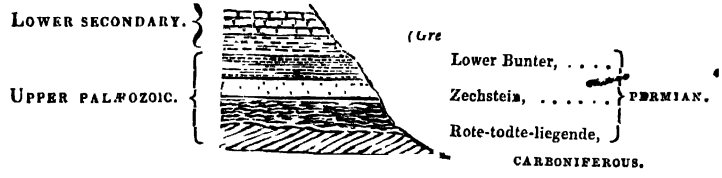
† See "Letter to M. Fischer Von Waldheim, Sept. 1841;" Leonhard's "Jahr Buch," part i. p. 91, 1842; "Phil. Magazine," vol. xix. p. 418.

beds of limestone identified with the Zechstein and Magnesian limestone by their organic remains are overlaid by a great thickness of marls, sands, and conglomerates, containing some of the same types of life as the lower members, particularly the plants which are very closely allied to and are in some instances identical with the vegetables of the carboniferous era. It became therefore desirable to ascertain whether similar palæozoic features were to be found in other parts of Europe. Now in Thuringia and Hesse Cassel, the Zechstein is, in numerous localities, conformably surmounted by red and spotted sandstones, in which no traces of fossils distinct from those of the Permian era are observable, the only land plant found in them (the *Calamites arenarius*) being inseparable from well-known carboniferous forms. This overlying sandstone being perfectly conformable to the Zechstein, may, it is conceived (like the overlying sandstones of Russia), be classed with that rock. In making this suggestion, the authors disavow the intention of derogating in any respect from the Trias of German geologists, also a tripartite system, and of which the muschelkalk is the centre, with certain red and mottled marls and sands beneath, and the keuper sandstone above. The Triassic system does not contain a single Palæozoic form, whether animal or vegetable, whilst the fauna and flora of the Permian are both so connected with the carboniferous and inferior systems, that they evidently constitute the last remnant of the same era. In the whole geological series, therefore, no two systems are more completely separated than the Permian and the Trias, the one forming the uppermost Palæozoic stage, the other the base of the secondary deposits.

After showing that the "Grès de Vosges," as described by M. Elie de Beaumount, is one of the arenaceous equavalents of the Permian system, and after alluding to its development in the neighbourhood of Strasburg and in other parts of Europe, where it is well separated from the Trias, attention is directed to the fact, that as far as researches had yet gone, the Trias is always conformable to the Permian, whilst the "rothe-todte-liegende," or base of the latter, is frequently unconformable to the carboniferous rocks on which it rests, and out of whose detritus it has often been formed. These phenomena, say the authors, prove that the most marked distinctions

between the fossils of succeeding formations cannot be referred to physical revolutions of the surface; for in the examples cited there is a sequence of "congeneric" remains, where the succession of the strata has been powerfully interrupted (Carboniferous to Permian), and a total change of fossils where the contiguous formations are conformable (Permian to Trias.)

These relations are expressed in this diagram :—



The Permian fauna is then considered, and is said to exhibit the last of the successive alterations which the Palæozoic animals underwent before their final disappearance. The total number of Permian species known to the authors in different parts of Europe (without reckoning certain ichthyolites not yet named, and a few doubtful forms of shells) is 166, of which 148 are characteristic of the system, 18 only being found in the subjacent Palæozoic rocks. The Brachiopods being viewed as the shells of most value in determining the durations of the ancient rocks, it is stated, that 10 out of the 30 Permian species are common to this system and the carboniferous. After some observations on the species of Productus, Spirifer, Orthis, Terebratula, Lepæna (Chonetes), which have lived on from earlier periods, it is remarked that no form of the Pentamerus, a genus peculiarly characteristic of the Silurian strata, has yet been found in the Permian strata, whilst the Brachiopod most frequent in the latter is the Productus, a genus very abundant in the carboniferous or conterminous deposits, but unknown in the Silurian. Among the Conchifers (26 in number) the Modiola is very characteristic of the Permian system, both in Russia and England; and though the large species of Axinus so well known in England has not yet been found in Russia, its place is there taken by two other species of the same

genus. The Avicula is also a good Permian shell, the *A. Kazanensis* being the best type in Russia, whilst the *A. antiqua* is there common to this deposit and the carboniferous.

The Gastoropods, so abundant in the carboniferous era have undergone great diminution before the formation of the Permian strata, and had great difficulty in accommodating themselves to new conditions; still more so the Cephalopods, for the forms of Goniatites, Nautili, and Orthoceratites, so very common in the preceding epoch, are almost unknown in this system, a fragment or two of one genus (Nautilus?) alone having been found in all parts of Europe. This scarcity of Cephalopods at the close of the Palæozoic series has a remarkable parallel in a subsequent geological period; for as these animals were reproduced in vast abundance and under many new forms in the Triassic, Jurassic, and Cretaceous systems, so towards the termination of the last of these we perceive a second and similar disappearance of the greater number of the shelly Cephalopods. The extreme reduction of the Gasteropods at the close of the cretaceous periods, as indicated by M. Alcide D'Orbigny, is also pointed out as an additional feature of analogy to the Permian changes. Trilobites, so eminently characteristic of the Silurian system, and which dwindle away to a few small species in the carboniferous system, are unknown in the Permian of Western Europe, and in Russia are only represented by a species of Limulus. Fishes, on the other hand, are numerous in proportion to the other Permian classes, 43 or 44 species being named, and several from Russia being yet undescribed; these are all, with one exception, absolutely peculiar to the stratum in which they occur, thus confirming the truth of the generalisation of Agassiz, that these vertebrata mark with great precision the age of the stratum in which they are found. Lastly, the Permian beds of Russia, like the Dolomitic conglomerate of England and the Kupferschiefer of Germany, contain bones of the codont Saurians, indicating the earliest appearance of animals of that high organisation, and their direct association with Palæozoic shells and plants, some of which are undistinguishable from true carboniferons species.

After thus following it back *in time*, the Permian fauna is next considered in horizontal extension or *distance*, the fossils of Russia being compared with those of similar age in western Europe. The

number of species collected by the authors in Russia is 53, or about one-third of the total number of the whole European fauna of the period, and of these 32 are peculiar to Russia, a large number when the recency and rapidity of the survey of the authors is adverted to; and when it is considered that 33 species only were found by Professor Sedgwick in deposits of this age in England, and 41, according to the recent tabular view of Geinitx, is the total number known in Saxony where the Zechstein is very fully elaborated. Like other formations of synchronous age when at great distances from each other, the Russian succession of Permian strata cannot be brought into a detailed analogy with that of western Europe. Instead of occupying a fixed place like the calcareous beds which represent the Zechstein, they inosculate with great thicknesses of fossiliferous grit, whilst Saurians and fishes with certain *Producti* and *Modiolæ*, as well as most of the plants, unquestionably occur in conglomerates, tufaceous limestone, and marls, which overlie the beds which contain Zechstein or Magnesian limestone fossils. In Germany, the Protorosaurus belongs to the Cupfer-schiefer which is below the Zechstein, whereas in Russia all the cupriferous and sauroid beds are above that rock.

In analysing the species common to the Permian system of Russia and the rest of Europe (by stating the number which have lived on from the carboniferous to the Permian, and the diminished proportion of the latter), Russia alone is appealed to, and three only of the Permian *species* of that country are found to descend into the Palæozoic rocks. The authors, therefore, infer that these results necessarily prove the existence of a relation between the greater or less duration of species and their propagation or extension to distant parts, thus confirming a law previously announced by one of them.

Some detailed observations then follow on the species in each class found in Russia, and Mr. Lonsdale is cited as having assured them that although the Permian corals are evidently Palæozoic in their generic characters, there is not a single species which is identical with a carboniferous form; and it is also remarked that of 20 species of Brachiopods found in Russia, 8 are peculiar to that country.

Lastly, deriving their knowledge of the specific character of the plants from the examination of M. Adolphe Brogniart, aided by Mr.

Morris, who had previously examined them, it appears certain, that whilst all the forms indicate a continuation of vegetable life of the same nature as that which prevailed during the carboniferous era, there are a few species *(Neuropteris tenuifolia Lepidodendrom elonyatum, and Calamites Suckovii)* which are identical with carboniferous plants, and not one which can be compared with a triassic plant.*

The results of the inquiries of the botanists, the authors conclude by remarking, are therefore completely in accordance with those of the palæontologist. They clearly prove that the Permian system is the uppermost stage of that long Palæozoic series, which, commencing with the lowest Silurian rocks, presents a connected succession of animal and vegetable life, the last traces of which passed away with the termination of the strata under review. Until Russia was explored, the upper member of these ancient rocks had scarcely afforded a trace of terrestrial plants. Neither in the British Isles nor in Germany had there been found more than one or two species of land plants in deposits of this age, not one of which has yet been fully identified or described. Now in reference to the Russian species, such of them as had been previously alluded to by other writers were placed by some in the carboniferous rocks, by others in the New Red Sandstone.† Our sections, however, have shown that neither of these views is correct; and as the Russian plants to which we have called attention, occur for the most part in strata distinctly *overlying* beds containing the fossils of the Zechstein, it is clear that certain red sandstones, marls and conglomerates, above that rock, belong to our Permian group, are wholly distinct from the Trias, and are truly Palæozoic.

We repeat, therefore, that we have now adduced ample botanical as well as zoological and stratigraphical evidence to vindicate the

* The species of plants, ten or twelve in number, which have been found in the Kupfer schiefer or the sandy beds associated with the Zechstein in Germany, are chiefly marine fucoids, and have been termed *Caulerpites*. According to M. Adolphe Brogniart, the only terrestrial plants of the German strata are the *Taniopteris Eckardi* (Germar), and a Neuropteris mentioned by Naumann, which not being determined must be considered doubtful.

† See a very recent memoir by M. Yasikoff, "Bull. de Moskou," 1843, part ii. p. 237, in which he refers an interesting portion of the Permian rocks described by us upon the Kama, and between that river and the Sok, either to the *New Red Sandstone or the Carboniferous Limestone.*

application of the collective word *Permian* to a succession of strata which had not been previously united through their geological relations and organic contents.

These proofs will, we trust, be considered as still more strongly borne out by the grandeur of the phenomena to which we have appealed; for the Permian deposits of Russia repose upon carboniferous strata throughout more than two-thirds of a basin which has a circumference of not less than 4000 English miles.

A detailed tabular list of the animal remains of the Permian system in Europe was also given, mentioning the names of the authors who have described each species, the localities at which it has been found, and its vertical range in the Palæozoic series. This table will appear "in extenso" in the forthcoming work upon Russia, and in the meantime the following recapitulation is subjoined: but the authors express their regret that their table was drawn up without the benefit of the long-promised assistance of Professor Agassiz. His observations on a few of the Permian ichthyolites which were submitted to him will increase the number of that class of fossils.

Recapitulation of the Fauna of the Permian System in Europe.

Classes.	Genera.	Total Number of Species in Europe.	Species exclusively peculiar to the Permian system in Europe	Species found in other formations.	Species found in Russia. *a.* Peculiar to the country.	*b.* Previously found elsewhere. In the Permian and older formations.	In the Permian beds exclusively.	In older formations exclusively.
Polyparia	7	15	13	2	3	1?	2	
Echinodermata..	2	2	1	1				
Conchifera, Ord. Brachiopoda	7	30	20	10	8	3	4	5
——— Ord. Dimyaria ..	10	26	26		8		3	
——— Ord. Monomyaria	5	16	15	1	4		3	
Mollusca, Ord Gasteropoda	11	22	19	3	3			
———Ord. Cephalopoda	1	3	3		1			
Annelida	1	2	2					
Crustacea	2	2	2		2			
Pisces..	16	43	42	1	2			
Reptilia..	4	5	5		1			
Total	66	166	148	18	32	3 or 4	12	5

Fourteenth Meeting of the British Association for the Advancement of Science. York, September 16.

[From the Athenæum,—Continued from page 147.]

The President's Address.

The noble Lord, to whose office I succeed, and who has introduced me to your notice, has spoken of me in terms, which, however flattering to my pride, I can only accept as the expression of his friendship and good-will; and I hope he will permit me to add, that whilst there are few persons for whose character and attainments I feel a more sincere respect, there is none whose favourable opinion I should be more anxious to merit. The members of the Association who were present at the meeting at Cork can bear witness to the courteous, dignified, and able manner in which he discharged the duties of his office, whilst others, who, like myself, had the opportunity of seeing them, could not fail to be deeply impressed with the magnificent works which are accomplished or in progress at his noble residence at Birr Castle. Whatever met the eye was upon a gigantic scale; telescopic tubes through which the tallest man could walk upright; telescopic mirrors, whose weights are estimated not by pounds but by tons, polished by steam power with almost inconceivable ease and rapidity, and with a certainty, and accuracy, and delicacy, exceeding the most perfect productions of the most perfect manipulation; structures, for the support of the telescope and its machinery, more lofty and massive than those of a Norman keep; whilst the same arrangements which secure the stability of masses which no ordinary crane could move, provide likewise for their obeying the most delicate impulse of the most delicate finger, or for following the stars in their course, through the agency of clock-work, with a movement so steady and free from tremors, as to become scarcely perceptible when increased a thousand fold by the magnifying powers of the eye-glass. The instruments, which were mounted and in operation at the time of my visit, exceeded in optical power, and in the clearness and precision of their definition of celestial objects, the most perfect productions of the greatest modern artists; and though much had been then accomplished, and great difficulties had been overcome, by a rare combination of mechanical, chemical, and mathematical skill and

knowledge, in the preparation for mounting the great telescope of six feet diameter and fifty-four feet focal length, yet much remained to be done: but I am quite sure that the members of the Association will learn with unmixed satisfaction, that the noble Lord has entirely succeeded in his great undertaking—that the great telescope has already made its essay, and that its performance is in every way satisfactory, and that he proposes to communicate to the Mathematical and Physical Section in the course of the present meeting, an account of the process which he has followed in the preparation and polishing of his mirrors, and of the expedients which he has adopted for bringing under the most perfect control the movement of the vast masses with which he has had to deal.

It is now more than sixty years since the elder Herschel, by the superior optical and space-penetrating powers of his telescope, began a brilliant career of astronomical discovery; and the interest which the construction of his great forty-foot reflector, a memorable monument of his perseverance, genius and skill, excited amongst men of science of that period, was not, if possible, less intense than what now attaches to the similar enterprise of the noble Lord: nor were the expectations which were thus raised disappointed by the result; for though this noble instrument was generally reserved for the great and state occasions of astronomy only, requiring too great an expenditure of time and labour to be producible for the daily business of observation; yet the very first time it was directed to the heavens it discovered the 7th satellite of Saturn, and contributed in no inconsiderable degree to the more complete development of those views of the construction of the heavens (I use his own expression) which his cotemporaries never sufficiently appreciated, but which present and future ages will probably regard as the most durable monument of his fame. It is no derogation to the claims of this great discoverer that art and knowledge are progressive, or that a successor should have arisen, who, following in the track which he has pointed out, should bring a considerable zeal and more ample means to prepare the way for another great epoch in the history of astronomical discovery; and I know that I do not misstate the sentiments of the accomplished philosopher who has succeeded to his name and honours, and who throughout his life has laboured with such exemplary filial

piety, and such distinguished success, in the development and extension of his father's views, that no one takes a deeper or a more lively interest in the success of this noble enterprise, and no one rejoices more sincerely in the vast prospects of discovery which it opens.

Gentlemen, it is now thirteen years since the British Association held its first meeting in this ancient and venerable city, under the presidency of the noble Earl, who is always the first to offer his services in the promotion of the interests of science, and of every good and useful undertaking; it was in this city that its constitution and laws were first organized, and it is by these laws, for which we are chiefly indebted to the excellent sense and judgment of Mr. William Vernon Harcourt, with very unimportant changes, the Association has continued to be governed. It is in conformity with the spirit of these laws, that we should seek to co-operate, and not to interfere with other Societies which have pursuits and objects in common with our own; that we should claim no right to the publication of memoirs which are read at our Sections, and which are not prepared at our request; that we should endeavour to concentrate and direct the influence of the public opinion of men engaged or interested in the pursuits of science, in favour of such objects, and such objects only, as they agree in considering important for its interests; and above all, that we should avail ourselves of the advantages which we possess in the extensive range of our operations, and in our independence of particular societies and particular localities, of organizing and carrying into effect well-digested systems of co-operative labour.

Again, our meetings were also designed to bring men who are engaged in common pursuits, and interested in common objects, into closer union and more frequent intercourse with each other; to encourage the more humble and less generally known cultivators of science, by bringing their labours under the notice of those men who are best able to appreciate and to give currency to their value; to enable our members to see, in the places which they visited, where all establishments are, with rare exceptions, most liberally thrown open to their inspection, whatever is most remarkable in the production of their manufactures, in the principles and construction of their machinery, in their collections connected with art or the na-

tural sciences, in their public establishments for charity or education, in the moral or physical condition of their inhabitants, or whatever other objects their neighbourhood presents, which may interest the antiquary, the geologist, or the lover of picturesque scenery;—we may venture to add, likewise, that they were designed for purposes of social as well as of philosophical recreation, a consideration of no small importance with men whose occupations are frequently monotonous and laborious, and such as require the occasional stimulus of change and variety.

In accordance with these views, we have visited in their turn the most remarkable localities of the three kingdoms, including the universities of England, Scotland, and Ireland, the great seats of our manufacturing industry, the great marts of our commerce. It is not necessary for me to speak of the success which has marked our progress. The numbers who have attended our meetings have been always large, and sometimes so great as to embarrass our proceedings, from the difficulty of finding adequate rooms to receive them. The communications which have come under the notice of our several Sections, have continued to increase in importance and interest, more particularly since the great co-operative inquiries of our body have come into full operation. We have been enabled, by the application of our funds, to complete some, and to forward many, scientific enterprises, of the highest importance and value; and I see no reason to apprehend that the future meetings of the British Association will not continue to advance in scientific interest, or will cease to exercise a most powerful influence in originating and promoting scientific labours which will equally tend to promote the interests of knowledge and the honour of the empire.

The founders of the British Association justly conceived, that men of different shades of political opinion or religious belief would rejoice in the opportunities which such meetings would afford them of coming together, as it were, upon neutral ground, where their natural warfare would, for a season at least, be suspended, and no sounds be heard but those of peace. They felt persuaded that the softening influence of mutual intercourse would tend to soothe the bitterness of party strife, and would expose to view points of contact and union, even between those whom circumstances had most vio-

lently estranged from each other, and show them that the features of the monsters of their apprehension were not so repulsive as their imaginations or intolerance had drawn them. I know that there are some zealots who are ready to denounce the interchange of the commonest charities of life with those whose opinions, however honestly and conscientiously formed, they believe to be unfounded or dangerous; but there is a wide and fundamental distinction between the condemnation of opinions and of the persons who hold them; and though I should be far from advocating that spurious and false liberality which should assume, that in the selection of friends, or even in the ordinary intercourse of society, there should be a total suppression of all that is distinctive, both of profession and of opinion, yet there are numberless occasions on which we can neither notice them or know of their existence, without the violation of all those rules of courtesy and good-breeding, which the most scrupulous regard for the integrity of our Christian profession and for the best interests of mankind would equally teach us to practise and to respect.

It was with a view of securing this neutral ground as the exclusive basis of their operations, that the founders of the Association cautiously guarded against any extension of its boundaries which might tend to admit new claimants to its occupation. They did not attempt to define the precise limits at which accurate science terminates and speculation begins, but they endeavoured to keep sufficiently within them to prevent the intrusion of discussions which might disturb the peace of our body or even endanger its existence; experience has fully established the wisdom of this law, and the absolute necessity of a rigid adherence to its provisions.

In returning to the scene of our first labours, the place of our nativity, but not of our childhood, it becomes us, as grateful children, to acknowledge our filial obligations to our founders. A reference to the list of these presents, as might be expected after a lapse of thirteen years, some very distinguished names, who have been lost to science. In their number we find the name of Mr. W. Smith, who first received at our meetings the ample recognition of the value of those original and unaided researches, which entitle him to be considered as the father of English Geology; of Dr. Lloyd, Provost

of Trinity College, Dublin, the father of our excellent colleague Prof. Lloyd, and the founder of that truly illustrious school of accurate science in that university, which has given to the world a Robinson, a Hamilton, and a M'Culloch; of Sir J. Robison, who inherited from his father, the well-known Prof. Robison, his taste for science and its application to the arts; of Dr. Henry, one of our most distinguished chemists, and only second in reputation to his fellow townsman, Dr. Dalton, whose very recent loss we have occasion to deplore, and whose name, under such circumstances, it would be unbecoming to mention in merely a passing notice.

Dr. Dalton was one of that vigorous race of Cumberland yeomen amongst whom are sometimes found the most simple and primitive habits and manners combined with no inconsiderable literary or scientific attainments. From teaching a school as a boy in his native village of Eaglesfield, near Cockermouth, we find him at a subsequent period similarly engaged at Kendal, where he had the society and assistance of Gough, the blind philosopher, and a man of very remarkable powers, and of other persons of congenial tastes with his own. In 1793, when in his 23rd year, he became Professor of Mathematics and Natural Philosophy in the New College in Mosley Street, Manchester, a situation which he continued to hold for a period of six years, and until the establishment was removed to this city, when he became a private teacher of the same subjects, occupying for the purposes of study and instruction the lower rooms of the Literary and Philosophical Society in George Street, rarely quitting the scene of his tranquil and unambitious labours, beyond an annual visit to his native mountains, with a joint view to health and meteorological observations. He made his first appearance as an author in a volume of 'Meteorological Observations and Essays,' which he published in 1793, and which contains the germ of many of his subsequent speculations and discoveries; and his first views of the Atomic Theory, which must for ever render his name memorable as one of the great founders of chemical philosophy, were suggested to him during his examination of olefiant gas and carburetted hydrogen gas. His theory was noticed in lectures which he delivered at Manchester in 1803 and 1804, and much more explicitly in lectures delivered at Edinburgh and Glasgow; it was, however, first made gene-

rally known to the world in Dr. Thomson's Chemistry in 1807, and was briefly noticed in his own system of chemistry which appeared in the following year; and though his claims to this great generalization were subject to some disputes both at home and abroad, yet in a very short time both the doctrine and its author were acknowledged and recognized by Wollaston, Davy, Berzelius, and all the great chemists in Europe. But the atomic theory is not the only great contribution to chemical science which we owe to Dalton; he discovered cotemporaneously with Gay-Lussac, with whom many of his researches run parallel, the important general law of the expansion of gases—that for equal increments of temperature, all gases expand by the same portion of their bulk, being about three-eighths in proceeding from the temperatures of freezing and boiling water. His contributions to meteorology were also of the most important kind. Dr. Dalton was not a man of what are commonly called brilliant talents, but of a singularly clear understanding and plain practical good sense; his approaches to the formation of his theories were slow and deliberate, where every step of his induction was made the object of long-continued and persevering thought; but his convictions were based upon the true principles of inductive philosophy, and when once formed, were boldly advanced and steadily maintained. It is always unsafe, and perhaps unwise to speculate upon the amount of good fortune which is connected with the time and circumstances of any great discovery, with some view to detract from the credit of its author; and it has been contended that Wollaston, Berzelius and others, were already in the track which would naturally lead to this great generalization; but it has been frequently and justly remarked, that if philosophy be a lottery, those only who play well are ever observed to draw its prizes.

"Though Dalton's great discovery," says the historian of the Inductive Sciences, "was soon generally employed, and universally spoken of with admiration, it did not bring to him anything but barren praise, and he continued in his humble employment when his fame had filled Europe, and his name become a household word in the laboratory. After some years he was appointed a corresponding member of the Institute of France, which may be considered as a European recognition of the importance of what he had done; and

in 1826, two medals for the encouragement of science having been placed at the disposal of the Royal Society by the King, one of them was assigned to Dalton, 'for his development of the atomic theory.' In 1833, at the meeting of the British Association for the advancement of Science, which was held at Cambridge, it was announced that the King had bestowed upon him a pension of 150*l.*; at the preceding meeting at Oxford, that University had conferred the degree of Doctor of Laws, a step the more remarkable since he belonged to the sect of Quakers. At all the meetings of the British Association he has been present, and has always been surrounded with the reverence and admiration of all who feel any sympathy with the progress of science. May he long remain among us, thus to remind us of the vast advance which chemistry owes to him." This was written in 1837, the year in which a severe attack of paralysis seriously impaired his powers; he last appeared among us at Manchester, when he received the respectful homage of the distinguished foreigners and others who were there assembled; he died on the 27th of July last, in the 78th year of his age. His funeral, which was public, was attended by all classes of the inhabitants, who felt justly proud of being the fellow-citizens of so distinguished a man.

I now proceed to notice some other topics which are connected with the distribution of the funds, and the general conduct of the affairs of the Association. Like other bodies, we have had our periods of financial prosperity and decline; and like other bodies, we have sometimes drawn more freely upon our resources, than their permanent prospects would justify. The statement which will be read to you by our excellent treasurer, (see *ante*, p. 882) will show, that during the last year our capital has been reduced: the great number of life subscribers, which at one time rapidly augmented our resources, has a natural and necessary tendency to reduce our annual subscriptions, at every succeeding meeting; and some alterations in the conditions of admission for those inhabitants of the places where we are received, who are not likely to follow the farther movements of the Association, have not tended to swell our receipts, though rendered, at the time, necessary by the great numbers who crowded inconveniently some of our sectional meetings.

I regret to find that some currency has been given to the notion,—which I believe to be altogether erroneous and unfounded,—that a

large excess of income above our necessary expenditure, which may be devoted to the promotion of scientific researches and scientific objects, is essential to the successful working of the business of the Association, and that our movements should therefore be always directed to those places, where our coffers are most likely to be filled. It may be quite true, that the objects of the Association are most certainly and effectually promoted by going to those places which are likely to attract the largest concourse of scientific visitors, and that our finances thus become immediately dependent upon our general prosperity: but if, under any circumstances, these two principles of selection should ever come into collision with each other, there can be no doubt to which of them our preference should be given; and though I think we should very imperfectly accomplish the design of our institution, if our tour of visits did not comprehend, in their turn, every important district in the three kingdoms, yet it would be not only unadvisable, but dangerous even to our very existence, if we fixed our standard in any locality which did not present a reasonable prospect of procuring the requisite scientific supplies, and of not sustaining the union, as well as vigorous action of the body to which we belong.

There are some great principles which have generally governed the Committee of Recommendations, in recommending, and the General Committee in confirming grants of money for scientific objects, which I hope we shall never lose sight of: that no part of our funds should ever be applied to defray the personal expenses, or to compensate the loss of time or labour of any of our members, in making researches or experiments, even when they are undertaken or made at the request of the Association: that they should not be granted for the general promotion of this or that branch of science, but for specific and well-defined objects: that in no case should they be applied to make a bookselling or other speculation remunerative, which would otherwise not be so: that the results of inquiries which are carried on, partly or wholly at our charge, should so far belong to the Association, as to secure its just claim to the scientific credit, which they are calculated to confer. I know that some of these principles have been, in some instances, partially departed from, under very pressing and peculiar circumstances; but the remembrance of the discussions to which some claims of this nature have

given rise, which it was improper to grant, but difficult and painful to refuse, has tended to confirm my own impression, not merely of the wisdom of these important rules, but likewise the almost imperative necessity of adhering to them.

It was at the memorable meeting of the Association at Newcastle, a period of great financial prosperity, that it was resolved to recommend and to undertake a very extensive system of astronomical reductions and catalogues: the first was the republication, under a greatly extended and much more complete form, of the Astronomical Society's catalogue, exhibiting the latest and most accurate results of astronomical observation, reduced to a common epoch, with the permanent co-efficients for their reduction, which the Nautical Almanac does not supply. The second was the reduction of all the stars in the Histoire Céleste of Lalande, nearly 47,000 in number, containing the most complete record which existed 60 years ago of the results of observation, and affording, therefore, an interval of time so considerable, as to enable astronomers, by comparing them with their positions as assigned by modern observations, to determine their proper motions and other minute changes, almost independently of the errors of observation: a third, was a similar reduction of stars in the Cœlum Stelli-ferum Australe, of Lacaille, 8700 in number, which had assumed an unusual degree of importance from the recently completed survey of the southern hemisphere by Sir John Herschel, and the establishment of observatories at Paramatta and the Cape.

Another work of still greater expense and labour, was the reduction and publication of the Planetary and Lunar Observations at Greenwich, from the time of Bradley downwards, which was undertaken by the Government at the earnest application of a committee of the Association appointed for that purpose, and acting in conjunction with the Royal Society. This great undertaking has been nearly brought to a conclusion under the systematic and vigilant superintendence of the Astronomer-Royal.

The publication of these works must form a great epoch in astronomy; and though the expense to which it has exposed the Association has been very considerable, and will amount, when completed, to nearly 3000*l.*, yet it cannot fail to prove a durable monument of the salutary influence which it has exercised upon the progress of science.

The catalogues of Lacaille and Lalande are to be printed and published, as is already known to you, at the expense of Her Majesty's Government; and the first, which has been prepared under the superintendence of Prof. Henderson, is nearly complete. The catalogue of Lalande and the British Association catalogue, were placed under the superintendence of Mr. Francis Baily; and in referring to the irreparable loss, which astronomical science has so recently sustained by his death, I should neither do justice to my own feelings nor to yours, if I did not detain you for a few moments.

Mr. Baily was, undoubtedly, one of the most remarkable men of his time. It was only in 1825, that he retired from the Stock Exchange, with an ample fortune, and with a high character for integrity and liberality; but his subsequent career almost entirely belongs to astronomy, and is one of almost unexampled activity and usefulness. The Astronomical Society was organized by him, and throughout life he was the most considerable contributor to its Memoirs. The catalogue of the Astronomical Society, the funds for which were contributed by several of its members, was entirely formed under his superintendence, and we are chiefly indebted to his exertions for the more ample development which the Nautical Almanac has latterly received, and which has added so much to its usefulness. There was no experimental research connected with the more accurate determinations of astronomy or physical science, which was not generally intrusted to his care: the publication of the Pendulum Observations of Capt. Foster, which were confided to him by the Admiralty, gave occasion to the most complete series of pendulum experiments which had ever been made, in which many most important defects of those instruments were first brought to light: he undertook the repetition of the celebrated experiment of Mr. Cavendish, and his discussion of the whole question, which forms a recent volume of 'The Memoirs of the Astronomical Society,' is a monument not less honourable to his patience, perseverance, and skill, than to the sagacity and accuracy of the great philosopher who first devised it.' He had also undertaken, for the Commission of Weights and Measures, the conduct of the process for forming the new standard yard from the scale of the Astronomical Society, which he had himself compared with the imperial standard yard, destroyed in

the burning of the Houses of Parliament. He published, at the request of the Admiralty, the correspondence and catalogue of Flamsteed; he presented to the Astronomical Society, a volume containing the catalogues of Ptolemy, Ulugh, Beigh, Tycho Brahe, Hevelius and Halley, with learned prefaces and critical notes, showing their relations to each other and to later catalogues. His preface and introduction to the British Association Catalogue, and more than one-third of the catalogue itself are printed; and from the critical examination of the authorities, upon which his assumed positions rest, and from the careful distribution of the stars which are selected (more than 8000 in number) in those parts of the heavens where they are likely to be most useful to observers as points of comparison, it promises to be the most important contribution to the cause of practical astronomy, which has been made in later times. The whole of the stars of the Histoire Céleste are reduced, and a considerable portion (more than one-fifth) printed, but it is not known whether the introductory matter which, from him, would have been so important, was prepared at the time of his death. Mr. Baily was the author of the best Treatise on Life Annuities and Insurances which has yet appeared, as well as of several other publications on the same subject. His knowledge of the mathematicians of the English school was very sound and complete, though he had never mastered the more refined resources of modern analysis. In the discussion of the Cavendish and other experiments, he freely availed himself of the assistance of the Astronomer-Royal, and Mr. De Morgan, in the investigation of formulæ which were above his reach; but he always applied them in a manner which showed that he thoroughly understood their principle, and was fully able to incorporate them with his own researches. In the midst of these various labours, (and the list, which I have given of them, ample as it is, comprehends but a small part of their number), Mr. Baily never seemed to be particularly busy or occupied: he entered freely into Society, entertaining his scientific as well as mercantile friends at his own house with great hospitality. He was rarely absent from the numerous scientific meetings of committees and councils—he was a member of all of them,—which absorb so large a portion of the disposable leisure of men of science in London: but if a

work or inquiry was referred to him, it was generally completed in a time which would seem hardly sufficient for other men to make the preliminary investigation. Most of this was undoubtedly owing to his admirable habits of system and order: to his always doing one thing at one time: to his clear and precise estimate of the extent of his own powers. Though he always wrote clearly and well, he never wrote ambitiously: and though he almost always accomplished what he undertook, he never affected to execute or to appear to execute, what was beyond his powers. This was the true secret of his great success, and of his wonderful fertility; and it would be difficult to refer to a more instructive example of what may be effected by practical good sense, systematic order, and steady perseverance.

It was the same meeting at Newcastle which gave rise to the design for the greatest combined scientific operation in which the Association has ever been engaged for the extension of our knowledge of the laws of magnetism and meteorology.

It was the publication of Colonel Sabine's Report on the variations of the magnetic intensity at different points of the earth's surface, and the map which accompanied it, which appeared in our volume for 1837, which first enabled the celebrated Gauss to assign provisionally the co-efficients of his series for expressing the magnetic elements; the proper data of theory are the values of the magnetic elements, at given points uniformly and systematically distributed over the surface of the earth: and it was for the purpose of supplying the acknowledged deficiency of these data, and of determining the laws which regulated the movements of this most subtle and mysterious element, the Association was induced to appoint a committee to apply, in conjunction with the Royal Society, to her Majesty's Government, to make a magnetical survey of the highest accessible altitudes of the Antarctic seas, and to institute fixed magnetical and meteorological observatories at St. Helena, the Cape, Hobarton, and Toronto, in conjunction with a normal establishment at Greenwich, and in connexion with a great number of others on the continent of Europe; where systematic and simultaneous observations could be made which would embrace not only the phenomena of magnetism, but those of meteorology also: it is not necessary to add that the application was promptly acceded to. The views and labours of the

framers of this magnificent scientific operation; the brilliant prospects of discovery which it opened; the noble spirit of co-operation which it evoked in every part of the civilized world, were alluded to in terms so eloquent and so just, in the opening address of Mr. W. Vernon Harcourt, when occupying this chair at Birmingham [see *Athen.* No. 618], that I should do little justice to them if I employed any terms but his own, and I must content myself with simply referring to them. Much of what was then anticipated, has been accomplished, much is in progress, and much remains to be done; but the results which have already been obtained have more than justified our most sanguine expectations.

Sir James Ross has returned without the loss of a man, without a seaman on the sick list, after passing three summers in the Antarctic seas, and after making a series of geographical discoveries of the most interesting and important nature, and proving, in the language of the address to which I have just referred, that for a man, whose mind embraces the high views of the philosopher with the intrepidity of the sailor, no danger, no difficulty, no inconvenience could damp his ardour or arrest his progress, even in those regions where

> Stern famine guards the solitary coast,
> And winter barricades the realms of frost.

The scientific results of the first two years of this remarkable voyage have been discussed and published by Col. Sabine in his contributions to Terrestrial Magnetism in the Transactions of the Royal Society; and they are neither few nor unimportant. They have shown that observations of declination, dip, and intensity, the three magnetic elements, may be made at sea with as much accuracy as on land, and that they present fewer anomalies from local and disturbing causes: that the effects of the ship's iron are entirely due to induced magnetism, including two species of it,—one instantaneous, coincident with and superadded to the earth's magnetism, and the other a polarity retained for a shorter or longer period, and transferable therefore during its operation by the ship's motion from one point of space to another: that in both cases they may be completely eliminated by the observations and formulæ which mathematicians have proposed for that purpose: no intensity greater than 2.1 was observed; and the

magnetic lines of equal declination, dip, and intensity, were found to differ greatly from those laid down in Gauss's Theoretical Map, the northern and southern hemispheres possessing much greater resemblance to each other than was indicated by that primary and necessarily imperfect essay of the theory.

The range of Sir James Ross's observations extends over more than three-fourths of the navigable parts of the southern seas; and you will learn with pleasure that one of his most efficient officers, Lieut. Moore, has been despatched from the Cape, with a vessel under his command, to complete the remainder.

Nothing could exhibit in a more striking light the completeness of the organization and discipline of the system of magnetic observations, than the observations of the great magnetic storm on the 25th of September 1841; it was an event for which no preparation could be made, and which no existing theory could predict; yet so vigilant and unremitting was the watch which was kept, that we find it observed through nearly its whole extent, and its leading circumstances recorded, at Greenwich, and in many of the observatories on the continent of Europe, at Toronto, St. Helena, the Cape, Hobarton, and at Trevandrum in Travancore; for even the mediatized princes of the East have established observatories, as not an unbecoming appendage to the splendour of their courts. Some of the observations of this remarkable phenomenon, and of many others (twenty-seven in number) of a similar nature, have been discussed, with great care and detail, by Colonel Sabine, and lead to very remarkable conclusions. They are not absolutely simultaneous at distant stations, nor do they present even the same succession of phases, as at first anticipated; and it is the disturbances of the higher order only which can be considered as universal. They are modified by season as well as by place, the influence of winter, in one hemisphere, and of summer in the other, on the same storm, being clearly distinguishable from each other. The simultaneous movements in Europe and America have been observed to take place sometimes in opposite, and sometimes in the same directions, as if the disturbing cause was in one case situated between these continents, and in the other not; and we may reasonably expect, when our observatories are furnished with magnetometers of sufficient sensibility to indicate instantane-

ously the effects of disturbing causes, that the localities in which they originate may be determined: these are very remarkable conclusions, and well calculated to show the advantages of combined observations; for such inquiries, observations in a single and independent locality, however carefully they may be made, are absolutely valueless.

The meteorological observations are made, in all these observatories, on the same system, and with equal care with those of magnetism; they embrace the mean quantities, diurnal and annual variations of the temperature, pressure of the atmosphere, tension of the aqueous vapour, the direction and force of the wind, with every extraordinary departure from the normal condition of these elements, as well as auroral and other phenomena. It would be premature to speak of the conclusions which are likely to be deduced from these observations, inasmuch as the reduction and comparison of them have hitherto made little progress, but they cannot fail to be highly important; for it is by the comparison of observations such as these, made with reference to a definite system, with instruments constructed upon a common principle, and carefully compared with each other, and by such means alone, that the science of meteorology can be not only advanced but founded. Our philosophical records have for the last century been deluged with meteorological observations; but they have been made with instruments adapted to no common principle, compared with no common standard, having reference to no station but their own, and even, with respect to it, possessing no sufficient continuity and system; they have been for the most part desultory, independent, and consequently worthless. It would be unjust to the merits of one of the most assiduous and useful of our members, Mr. Snow Harris, if I did not call your attention, in connexion with this subject, to his P[redacted]ts, included in the reports of our twelfth meeting, [*Athen.* N[redacted]9, see also No. 827,] on the meteorological observations at Plymouth, made by him or under his superintendence, with the aid of a very moderate expenditure of the funds of the Association. They comprehend observations of the thermometer, at every hour of the day and night, during ten years, and of the barometer and anemometer, during five years, carefully reduced and tabulated, and their mean results *cynographed* or pro-

jected in curves. Nothing can exceed the clearness with which the march of the diurnal changes is exhibited in these results; and I sincerely hope that means may be found for printing them in such a form as may secure to them their permanent authority and value.

Another discussion of the meteorological observations made at sixty-nine stations at the equinoxes and solstices in the years 1835, 1836, 1837, and 1838, which have been reduced, and cynographed with great care and delicacy by Mr. Birt, at the expense of the Association, forms the subject of a Report by Sir J. Herschel, [*Athen.* No. 828,] in the volume of our Reports for the present year, and may be considered as a prelude, on a small scale, of the species of analysis which the results of the great system of observations now in progress should hereafter undergo. The inferences which are drawn from the examination of the changes of atmospheric pressure, with more especial reference to the European group of stations only, are in the highest degree instructive and valuable.

The system of magnetic observatories was at first designed to continue for three years only, but was subsequently extended to the 1st of January 1846: for it was found that the first triennial period had almost elapsed before the instruments were prepared, or the observers instructed in their duties, or conveyed to their stations. The extent also of co-operation increased beyond all previous expectation: six observatories were established, under the zealous direction of M. Kupffer, in different parts of the vast empire of Russia,—the only country, let me add, which has established a permanent physical observatory. The American government instituted three others at Boston, Philadelphia, and Washington; two were established by the East India Company at Simla and Sincapore; from every part of Europe, and even from Algiers, offers of co-operation were made. But will the work, which has thus been undertaken with such vast prospects, be accomplished before the termination of the second triennial period? or is it not probable that the very discussion of the observations will suggest new topics of inquiry, or more delicate methods of observation? If the march of the diurnal, monthly, and annual movements of the needle be sufficiently determined, will its secular movements be equally well known? In other words, shall we have laid the foundations of the theory, which may

even imperfectly approximate to the theory of gravitation, in the accuracy and universality of its predictions? It is with reference to these important questions, and the expediency of continuing the observations for another triennial term, that M. Kupffer, too, addressed a letter to Col. Sabine, suggesting the propriety of summoning a Magnetic Congress, to be held at the next meeting of the British Association, and at which himself, Gauss, Humboldt, Plana, Hansteen, Arogo, Lamont, Kairll, Bache, Quetelet, and all other persons who had taken a leading part in conducting, organizing or forwarding these observations, should be invited to attend. This proposal has been for some time under the anxious consideration of your Committee of Magnetism, consisting of Sir J. Herschel, Col. Sabine, the Astronomer Royal, Dr. Lloyd, the Master of Trinity College, and myself; and it will be for the General Committee, before we separate, to decide upon the answer which must be given. I think I may venture to say, that there would be but one feeling of pride and satisfaction, at seeing amongst us the whole or any considerable number of these celebrated men; and there can be little doubt but that, whatever be the place at which you may agree to hold your next meeting, they will experience a reception befitting the dignity of these great representatives of the scientific world.

It is quite true, that the preparations for such a meeting would impose upon your Committee of Magnetism, and more especially upon Col. Sabine, no small degree of labour. Reports must be received from all the stations, up to the latest period, of the state of the observations; their most prominent results must be analyzed and compared, and communicated as extensively as possible amongst the different members of the congress, so as to put them in possession of the facts upon which their decision should be founded. Great as is our reliance upon the activity and zeal of Col. Sabine, and of his admirable co-adjutor Lieut. [redacted]ell, perfect as is his acquaintance with every step of an inquiry, with the organization and conduct of which he and Prof. Lloyd have had the principal share, I fear that he would require greater means than his present establishment could furnish, to meet the pressure of such overwhelming duties.

If it should be the opinion of such a congress that it was expedient to continue the observations for another triennial period, and if

such an opinion were accompanied by an exposition of the grounds upon which it was founded, there can be little doubt that there is not a government in the civilized world which would not readily acquiesce in a recommendation which was supported by such authority.

The last volume of our Transactions is rich in Reports on Natural Science, and more especially in those departments of it which have an important bearing on Geology: such is Prof. Forbes's Report 'On the distribution of the Mollusca and Radiata of the Ægean Sea,' [*Athen.* No. 830] with particular reference to the successive zones of depth which are characterized by distinctive forms of animal life and the relation between existing and extinct species. You will, I am sure, be rejoiced to hear that Her Majesty's Government has not only secured the services of its author, in connexion with the geological survey, but has most liberally undertaken, upon the application of the Council, to defray the expense of printing the very interesting work upon which this Report is founded. The report of Mr. Thompson, of Belfast, on an analogous branch of the Fauna of Ireland, is remarkable for the minuteness and fulness of the information which it conveys. Prof. Owen has continued his report on the British Fossil Mammalia, which was begun in the preceding volume, and towards procuring materials for which a contribution was made from the funds of the Association. I regret to find that a class of Reports on the recent progress and existing state of different branches of science, which occupied so large a portion of our earlier volumes, and which conferred upon them so great a value, have been almost entirely discontinued: if the authors of these Reports could find leisure to add to them an appendix, containing the history of the advances made in those branches of science during the last decad of years, they would confer an important benefit on all persons engaged in scientific inquiries.

The history of the sciences must ever require these periodical revisions of their state and progress, if men continue to press forward in the true spirit of philosophy to advance the boundaries of knowledge; for though there may be impassable boundaries of human knowledge, there is only one great and all-wise Being, with whom all knowledge is perfect, who can say, "Thus far shalt thou go, and no further." The indolent speculator on the history of the sciences

may indulge in an expression of regret that the true system of the universe is known, that the law of gravitation is discovered, that the problem of the three bodies is solved, and that the rich mine of discovery is exhausted, and that there remain no rich masses of ore in its veins to make the fortune and fame of those who find them: but it is in the midst of this dream of hopelessness and despondency that he is startled from time to time by the report of some great discovery—a Davy has decomposed the alkalies; a Dalton has discovered, and a Berzelius has completely developed the law of definite proportions; a Herschel has extended the law of gravitation to the remotest discoverable bodies of the universe; and a Gauss has brought the complicated and embarrassing phenomena of terrestrial magnetism under the dominion of analysis: and so it will ever continue to be whilst knowledge advances, the highest generalizations of one age becoming the elementary truths of the next. But whilst we are taking part in this great march of science and civilization, whilst we are endeavouring to augment the great mass of intellectual wealth which is accumulating around us, splendid as may be the triumphs of science or art which we are achieving, let us never presume to think that we are either exhausting the riches or approaching the terms of those treasures which are behind. Still less let us imagine that the feeble efforts of our philosophy will ever tend to modify the most trivial and insignificant—if aught can be termed trivial and insignificant, which He has sanctioned—of those arrangements which the great Author of Nature has appointed for the moral or material government of the universe. Far different are the lessons which He taught us, by the revelation of His will, whether expressed in His word or impressed on His works. It is in a humble and reverent spirit that we should approach the fountain of all knowledge; and it is in a humble and reverent spirit that we should seek to drink of the living waters which ever flow from it.

Mr. John Taylor read the Treasurer's account, already printed in the Report of the General Committee [*ante*, p. 882]. Prof. Phillips read the programme of proceedings.

The Marquis of Northampton moved, and Earl Fitzwilliam seconded, thanks to the President, which being carried by acclamation, the meeting adjourned to Wednesday, Oct 2.

(To be continued.)

The late MR. WILLIAM GRIFFITH.

In a letter from Dr. Horsfield, we learn that on the intelligence of Mr. Griffith's death reaching Lord Auckland, his Lordship in a most kind and benevolent manner prepared without delay from his own recollection, a Memoir of this distinguished man, which was incorporated with the address read at the Anniversary Meeting of the Royal Asiatic Society on the 17th May, and excited much interest.

We mention the circumstance as highly creditable to, and characteristic of, the generous character and disposition of Lord Auckland who, we may remark, was one of Mr. Griffith's kindest friends while in India, and the first to appreciate rightly his eminent merits, both as a scientific man, and public servant.

The memoir adverted to has been in the most kind and condescending manner presented to us since the above notice was written. It is as follows.

Extract from the Anniversary Address to the Royal Asiatic Society of Great Britain and Ireland, May 17, 1845.

MR. GRIFFITH was one of the most accomplished botanists of our day; with the most accurate and extensive acquisition of learning in his department, he combined a spirit of activity and enterprise, such as has been rarely equalled, great talents, and a very remarkable power of labor, arrangement, and application. He was born in the year 1810, and was educated at the London University. He went out to India, as an assistant-surgeon on the Madras Establishment, where he arrived on the 24th September, 1832, and was shortly afterwards selected by the Bengal Government for the examination of the botany of the Tenasserim Provinces. He was, in 1835, deputed to Assam, with Dr. M'Clelland, for the purpose of assisting Dr. Wallich in his inspection of the growth of the Tea plant in Assam, and from thence he proceeded, in company with Dr. Bayfield, to the then unexplored tracts which lie between Suddiya and Ava,

upon the extreme frontier of our Eastern territory. In 1837 he accompanied Captain Pemberton on his mission to the wild countries of Boutan. In 1839 he was sent, with the army of the Indus, to prosecute inquiries into the botany of Affghanistan. In 1841 he was appointed to the medical duties of Malacca. In 1842, upon Dr. Wallich's absence, from illness, at the Cape, he was intrusted with the superintendence of the Botanical Garden at Calcutta, and with the duties of the Botanical Professor in the Medical College; and, upon the return of Dr. Wallich from the Cape, he resumed his place at Malacca, where he was seized with disease of the liver, and died at the early age of thirty-four, having already acquired a distinguished reputation,—having in every capacity in which he served the Government received its approbation and its thanks; and having given a promise of such further services to botanical science as few have had either the opportunity or the talent of affording. In all his varied and extensive journeys, his courage and his energy never failed him; whether in the jungles of Assam, or the hills of Affghanistan, he still pursued his researches, undeterred by danger, either of disease or of violence, and if disabled, as he was more than once by fever and debility, his first convalescence found him ever ready for fresh exertions. He had thus, by the application of extraordinary powers of observation, and in perquisitions extending through the vast regions which have been enumerated, formed large and valuable collections, and brought together materials for a great botanical work; and he looked with impatience to a period of repose for compiling a Scientific Flora of India, when he sunk under his last fatal illness. Perhaps no more impressive picture of the energy of this extraordinary man, and of his devotion to his favorite science, can be given than that which may be drawn from the following extracts from a letter which was dictated by him on his death-bed, and addressed to Dr. M'Clelland:—

"I write this by deputy, being seriously ill of hepatitis; the attack has been very severe, and the treatment necessarily active, so that I am reduced to an extreme state of weakness. Although my adviser does not despair, still the issue is doubtful, and under this impression I commence a few lines to you on business.

"Mrs. Griffith (supposing the result of this illness to be fatal to me) will bring up with her all the collections at Malacca, and they

being added to those at the export warehouse, and all having been previously cleaned and packed, I leave to you to present to Government, for the Honorable Court of Directors, to be sent home without any delay. As you know the trouble I have taken with these collections, and the hopes I had of making them subservient to a general scientific Flora of India, I need not impress on you how much I am interested in their proper disposal, and their being brought properly before the scientific public; and I would say the same regarding my drawings and manuscripts, which will accompany my wife to Calcutta, should it so happen that I leave her.

"In all the plans which I have consigned to your execution, both regarding my wife and collections, I am confident your own feelings will prompt you to every exertion on my account. Asking God's blessing on you and your wife, I bid you good bye.

"Thus far," continues Dr. Moorhead, his medical attendant, "was written at Mr. Griffith's dictation, but I grieve to say the fatal result came to pass yesterday evening, Sunday, 9th February, at half-past seven o'clock."

Memoranda on the above by Dr. M'Clelland.—"To the above details, furnished by Dr. Moorhead, I may remark that Mr. Griffith's constitution for the last two or three years seemed greatly shattered, his energies alone remaining unchanged. Exposure during his former journeys and travels laid the seeds of his fatal malady in his constitution, while his anxiety about his pursuits and his zeal increased; he became care-worn and haggard in his looks, often complaining of anomalous symptoms marked by an extreme rapidity of pulse, in consequence of which he had left off wine for some years past, and was obliged to observe great care and attention in his diet. In Affghanistan he was very nearly carried off by fever, to which he had been subject on his former travels in Assam. No government ever had a more devoted or zealous servant, and I impute much of the evil consequences to his health, to his attempting more than the means at his disposal enabled him to accomplish with justice to himself."

Although Mr. Griffith's researches were directed primarily to Botany, he neglected no opportunity, during his visits to various parts of India, of attending also to other departments of Natural History. Of his zeal and success in Zoology, the collections which he made afford abundant proof; they consist chiefly of mammalia, birds, fishes,

and insects. While attached to the army of the Indus, he made, on account of Government, large collections of mammalia and birds, which have been transmitted to the Honourable Court of Directors, and which constitute a valuable addition to the museum at the India House. In mammalogy he collected a considerable number of the smaller animals of Affghanistan, among which are several new to science; but his ornithological collections are more extensive, having brought together about six hundred specimens, not only from the route of the army, but from several separate excursions to the ranges of mountains north of Cabul. Besides the discovery of a considerable number of new species, the interest of these collections consists in their affording, perhaps, the most extensive and instructive illustration of the geographical distribution of the several species of birds found in India, which has as yet been attempted.

Mr. Griffith has also been zealous and successful as a collector of the fresh water fishes of India, during his various travels: the importance and extent of these is detailed in a paper on the subject, printed in the second volume of the Calcutta Journal of Natural History; and some of his discoveries in Entomology have been communicated to the public by the Rev. F. W. Hope, in the eighteenth volume of the Transactions of the Linnæan Society of London.

He was most especially remarkable for the philosophical spirit in which he invariably prosecuted his researches, and for the patience with which he watched the most minute phenomena which appeared to him connected with the subjects of his investigation. Some of his published papers, especially those on Vegetable Impregnation and the Progressive Development of Organs, have never been excelled and rarely equalled.

The merits of this accomplished naturalist and devoted labourer in the field of scientific discovery, were appreciated and fostered by the noble President of this Society while at the head of the Government of India, and it is to his Lordship's kindness that the Society are indebted for some of the most interesting parts of the foregoing communication. His loss has also been recently noticed in terms of deep regret by the present Governor-General, Sir Henry Hardinge, in his Excellency's Address at the annual distribution of honors and prizes at the Bengal Medical College.

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As it is understood that the whole of the valuable materials prepared and collected by Mr. Griffith are consigned to the Directors of the East India Company, the most confident hopes may be cherished that the expectations of the scientific world will not be disappointed of the full benefit which they are calculated and were intended by him to confer on botanical and zoological knowledge, and that the irreparable loss entailed on his widow by his early death, and the sudden extinction of all those hopes of fortune, honour, and reward, which his extensive knowledge and indomitable energy were so well calculated to raise, will meet with such alleviation as, to the enlightened liberality of the Honourable Court, the great value of his labours, and the forlorn and ill-provided state of his widow and family, may be considered to merit.

In connection with the above we may remark, that the late Mr. Griffith's private collections, MSS. and drawings are now exposed at the Export Warehouse in Tank Square, preparatory to making them over to the Government. The MSS. consist of eight or ten bound volumes of botanical researches, affording also full details of the natural productions and objects of cultivation, scenery, people, &c. throughout the lines of his extensive travels, together with the heights and position of Passes and principal places, fixed by direct barometrical and astronomical observations made by himself.

His botanical researches as exhibited in these Manuscripts, are of the most extensive and important nature, so much so that their publication will constitute a new era in botanical science, and confer immortal honor on the public body or the individuals by whom it may be brought about.

Besides the vols. of MSS. above adverted to, there are at least as many volumes more of scientific Botanical drawings and descriptions of plants contained in the Herbarium, or met with in his travels.

In addition to his Will, dated 31st Oct. 1844, and his letter on his death-bed, quoted in the foregoing memoir, he has

also left the following instructions written on the same melancholy occasion, regarding the disposal of his collections and papers.

All specimens of whatsoever sort or kind to be presented and given to the Honorable E. I. Company. Vide documents enumerated below.

1st. A list of Collections left at the Export Warehouse, Calcutta.

2nd. Collections now in my possession at Malacca, no list made out.

All Drawings and Manuscripts relating to Natural History also to become the property of the Hon. E. I. C.

The collections are arranged chiefly from the countries in which they were made, and each bundle is, or was, marked outside with the natural family and the name of the country. To almost each of the collections there is a rough volume of MSS. containing numbers tallying with the No. marked on the specimens: many other tickets also give besides additional localities, (thus all the localities of the Affghan collections, many of the duplicates of which have lately been sent to Mr. Lemann,) are to be found in the Affghan MSS and an additional vol. of MSS. gives barometrical heights and astronomical observations; so are Cossiah, Assam, Bootan, Mergui, Mishmay, &c. but there are some general collections which were commenced to be arranged generally, and some of the Natural Families in which I was most interested, as "Ternstromiaceæ," "Ericiniæ," "Menispermaceæ," "Vaccinieæ," are also arranged generally; in such cases the locality of each species of specimen is marked in pencil on the cover of the sheet. The collections of *Mosses and Ferns* duplicated (the last of which are now with Sir Wm. Hooker and Mr. Lemann) are among the most complete and I trust that the Honorable Court will allow them to be placed for elucidation with Sir Wm. Hooker and Mr. Wm. Harvey, of Trinity College, Dublin.

The collections in spirits of wine in five boxes, contain flowers and often fruit of almost all the interesting kinds; this was done to afford good opportunities of studying them afterwards, as the constant travelling during which most of the collections were made, did not admit of their minute examination in the fresh state; they will require fresh spirits, and in most cases fresh arrangement.

Although the MSS. and drawings are a good deal confused, often rubbed and torn, yet, as they relate to India plants examined in their fresh state, a little trouble will, I hope, enable them to prove of use, for which intent I beg to recommend them to be arranged by Mr. Lemann, Sir Wm. Hooker, Mr. Bentham.

I recommend myself to Mr. Brown, Dr. Lindley, Mr. R. H. Solly, Dr. Wight, Mr. Bentham, Dr. Martius, Dr. Nees Von Esenbeck, Mons. Decaisne, trusting that they have considered my exertions creditable, and that they will assist in favour of my reputation as a scientific Botanist, which I had hoped a longer life would have enabled me to establish. * * * * * * * * * * *

To the Honourable Court, I humbly recommend my three unmarried sisters, Apollonia, Matilda and Letitia, left in very indifferent circumstances, trusting that the Honourable Court will be pleased to grant them some degree of favour in continuance of their unvaried patronage of Indian Botanical pursuits, and their constant condescension to me.

Signed, by the Medical officer who attended him,

WILLIAM MOREHEAD,

Madras Medical Service.

With the following views of Dr. Wight on the subject, we conclude our remarks for the present.

Extract of letter from R. WIGHT, *Madras Medical Service, to* J. MCCLELLAND, *Assistant Surgeon, Bengal Service, dated Coimbatore,* 31*st March,* 1845.

"You ask me what I think whether to continue or drop the journal, my idea is that the surest plan by far for ensuring the publication of Griffith's papers is to continue the publication of the journal, each number of which may be made to absorb a portion of them, and when they are all published, it may then become a matter of consideration as to its further continuance. But in the mean time it is an object to preserve the fruits of one of the ablest and most untiring labourers that ever embarked in the culture of the fields of

science. To obtain that certainty, and without the risk of loss to his friends and family, the journal affords a medium. True it may not give them so wide a circulation as they merit, but still they are secured in the first instance, and if it is found that there is a demand for them after, his whole works could be collected and printed in a distinct form.

"My advice then is, decidedly to continue the journal for the present, even in the event of its being found that the whole of his papers are not intrusted to our joint care. If they are, there can be no doubt, in my mind, of the propriety of carrying on the journal; if they are not, then between Mr. Gardner and myself we will easily keep up its character as a Botanical periodical for at least another year. If the papers are intrusted to our care, immediate steps must be taken for their publication, as things of that kind don't keep; other labourers are at work in the same field, and unless we at once commence the business, much will be lost. Acting on this principle, you ought, if we are to have the publication of them, to advertise in the forthcoming number, that the publication of the late Mr. Griffith's papers is to be immediately commenced in the journal, and will be continued through successive numbers until the whole are printed. As regards my co-operation, use my name in the way you may think most advantageous with reference to both the journal and MSS.

"Should further funds be wanted, I shall gladly help to the extent of 500 rupees in successive portions, or in getting his drawings printed."

From the same, dated Ootacamond, 4th May 1845. "I shall endeavour in this letter to keep as close to the subject as possible in offering suggestions for carrying out what was evidently to the last uppermost in his mind; namely, the proper preservation and disposal of his collections, manuscripts, and drawings, so as to insure their being rendered as much as possible available to the advancement of the science of which he was such an enlightened and untiring cultivator. Towards accomplishing the wish expressed in the following words of his last letter, preservation is the first and grand object, publicity the next. 'As you know the trouble I have taken with

these collections, and the hopes I had of making them subservient to a general scientific flora of India, I need not press on you, how much I am interested in their proper disposal, and their being properly brought before the scientific public; and I would say the same regarding my drawings and manuscripts.' The two can easily be combined by printing and publishing the whole in this country before sending a single line or drawing out of it. Once published, they are at once and for ever safe, and doubtless they will be as carefully edited here as they could be in Europe, where those of his friends who are really qualified to do them justice, and would be willing for his sake to take the trouble, have for the most part occupation enough of their own.

"But even supposing we had an Editor in Europe ready to engage in the duty, which is far from being the case now that Mr. Solly is no more, still as nearly all his labours have reference to Indian Botany, his papers to my mind, ought beyond all question to be first published in India, especially under the existence of a proper medium for doing so in your journal, which is very fairly supported by the public.

"On these grounds I am strongly of opinion that an immediate application should be made to Government for them, for the purpose of publication in the journal previous to their being sent to Europe, of course giving the assurance that the utmost care will be taken of the originals, and that no pains will be spared towards having them as correctly edited as circumstances will permit. It could at the same time be urged, as you observe, that publication here does not interfere with ultimate publication in Europe in a more perfect form, accompanied with all his already published papers; nor do I think that previous publication in the Journal would at all interfere with the sale of a complete edition of all his works, should such be afterwards published. I confess I feel most anxious for the publication of his Botanical papers in this country, under the impression that, should they ever find their way to the India House before publication, the labours of the greatest Botanist that ever set foot in India will be lost, perhaps for ever swamped, amidst the accumulated records of hundreds of men, that are daily being added to their stores.

"So much for Papers, now to Collections. For the same reasons that it would be wrong to send home his papers uncopied, I think it would be equally wrong to send his collections in mass.

"A complete set of his specimens ought, I think, to be retained for India. This might be easily accomplished, as requiring, on the part of the person making the division, no Botanical knowledge; all that is wanted on his part being to lay aside one or two specimens from each paper, with copies of whatever remarks or labels might be attached to the original specimens, so as to make the set kept back for India, as nearly a facsimile of the other as possible. Thi ssuggestion I think it would be judicious to bring to the notice of Government, both with a view to guard against accidents, and to preserve to India a lasting and proud memorial of the most Herculean labours of one of the most philosophical and industrious men that ever traversed its soil for the purpose of investigating its natural products."

Dr. Wight next alludes to the probability of the collection being for a time useless. "But still these should not stand in the way of doing justice to the memory of Griffith, were it for no other purpose than to act as a stimulus to those who come after. And to ensure this work being done in the best manner, I will willingly give my services to seeing it executed, first by securing the specimens against the attacks of insects through the application of a spirituous solution of corrosive sublimate, and then having them properly glued down on suitable paper for reference, at the same time arranging them as correctly as my limited time and imperfect knowledge of many of them will permit, into their proper natural orders and genera.

"So prepared, they might then be deposited among the Garden collections for the benefit of all future Indian Botanists who might wish to consult them. The cost of thus securing them against all contingencies, would not I dare say, exclusive of the paper which would come from the stores, exceed one hundred rupees, while the cases to contain them might be provided for probably at 100 or 150 rupees more, and to Indian Botanists such a collection must be well worth ten times the amount. I would urge the adoption of this plan, for the sake of all future Indian Botanists."

"From the same, dated Coimbatore, 20th June 1845. "As you remark, I do not see that poor Griffith's final instructions regarding

the disposal of his collections in any way affects the suggestions I offered in my last, which I trust the Government will sanction; should such prove the case, then the first thing to be done is, to subject the whole collection to the preserving effects of a solution of corrosive sublimate in spirits, which effectually destroys any insects, whether hatched or in ova, for should the eggs afterwards hatch, the insect is immediately poisoned. For this purpose a solution of the strength of about one and half or two drachms to the pint is required, to which two or three drachms of camphor is added. It is applied with any sort of brush, the flowers being carefully soaked, as being most liable to attack, and the most important part of the specimen. A watery solution might answer equally well, except that it does not dry so soon, and by wetting the paper is apt to cause mouldiness. A considerable collection of Malacca plants he sent me just before leaving Calcutta, is now undergoing that operation preparatory to their being glued down for incorporation with my general Herbarium.

"Having been thus guarded from the depredations of insects, the next operation is, to have them glued down on suitable paper, and disposed in cases. The paper that I would recommend for the purpose, both as being cheap and generally quite large enough, is that known under the name of Laid Demy. The size is, as near as I can guess, about sixteen by ten inches; it is rather small for some plants, but large enough for 99 out of the 100, and the larger ones can be folded a little or cut to fit the paper.

"The collections," he says, "are all grouped into natural orders following Lindley's arrangement. These groups should be most carefully preserved, enclosed in wrapper sheets (the specimens are put on half sheets) each marked on the left hand corner with the name and number of the order as given in Lindley, and finally arranged in boxes according to the numerical series, which greatly facilitates consultation, and the number at once points out the proper place of each packet in the series.

"I have been thus particular on the supposition that you, not being a Botanist, might never have had an opportunity of studying the economy of a Herbarium. My own Herbarium occupies twenty boxes, each three feet high within, and wide enough to contain two series, somewhat in that form with double doors for facility of access. It

would be more economical to make the box six feet high at once; mine are adapted for travelling; that would be a standing one never to be moved. The location of such a collection is of some moment; I would suggest that it form an appendage of the Medical College.

"If sent to the Garden, it might chance some few years hence to suffer the fate of Roxburgh's, which would be bad indeed. Supposing these suggestions adopted, it then follows, as a matter of course, that the MSS. referring to each family should be printed, and two or three copies deposited in the Herbarium for the information of Botanists, who might at any time have to consult the plants. The easy way of course to provide these would be, by printing the whole in a continuous series in the Journal, and striking off twenty or thirty spare copies to serve for both this country and Europe. The originals could then without risk be sent for deposit in the Museum of the India House. The expense of these arrangements would not exceed a few hundred rupees, and, to say the least, is a mark of respect which the Government owes to one of its most zealous servants,—a more zealous one, I am convinced, it never had. But leaving that out of the question, I apprehend that, as being, of all existing Governments, that which has, throughout, been the most steady and consistent promoter of science and scientific men, it owes it to itself for its own credit; as there does not at this moment exist a single doubt, in the mind of any competent living Botanist, that Griffith at the time of his death stood second only on the list of truly philosophical Botanists, exclusive of his high attainments in other branches of natural science; and to fail in giving every facility to the posthumous diffusion of his unpublished labours, would be a blot on its hitherto untarnished character as the most liberal supporter of Indian science, the more indefensible too, as all that is required could be accomplished at so small a cost, that I would myself, at my own charge, undertake all I have suggested should be done, had the donation been made to me in place of to the Government. These suggestions though hurriedly written, are not the off-hand reflections of the moment, but the result of much consideration of the subject to which they refer; such being the case, you are quite at liberty to make use

of my sentiments, should you think them in any way calculated to advance the object in which we both feel so deeply interested, namely, that we at least, in common I believe with the whole Botanical world, 'consider his exertions creditable,' and are most anxious to assist in establishing on the broadest basis his reputation 'as a scientific Botanist,' which, unhappily for natural science, he has not lived to do for himself."

Extract of the Will of the late Dr. Griffith, *dated* 30*th Oct.* 1844.

"I give and bequeath all my Books to John McClelland, Assistant Surgeon in the East India Company's Service on their Bengal Establishment, and Robert Wight, Surgeon in the said East India Company's Service on their Madras Establishment, equally between them, and to the survivor of them; and I direct my Executors to put them or him in possession of every such Books as soon as conveniently may be after my decease: I leave, give, and bequeath all my collections of Natural History and all my Manuscripts and Drawings unto the Honourable the East India Company, and all my Microscopes to Richard Horsman Solly, Esq. number Forty-eight, Great Ormond Street, Bloomsbury, London; and direct my Executors to put the said East India Company and the said Richard Horsman Solly in possession of the same, respectively, as soon as conveniently may be after my decease.

"(Signed) William Griffith."

New Subscribers.

Dr. Row, Dum-Dum.
Dr. McLeod, 58th Regt. N. I.,
Dr. Hutchinson, Civil Assist. Surgeon, *Arrah.*

Papers Received.

Contributions towards a Flora of Ceylon, by George Gardner, F.L.S., Supdt. of the Royal Bot. Garden, Kandy.

Notes on Indian Botany, by Robt. Wight, M.D., F.L.S. &c.

Errata in No. 21 of Journal.

Page 37,	10th line from bottom	for "*Paris*" read "*Pure*"
39,	4th line from top	for "*40lbs.*" read "*40 Rupees*"
41,	19th ———	for "*Bad*" read "*Bar.*"
43,	Last line,	for "*dued*" read "*Due.*"
44,	2nd line from top	for "*Reitron's*" read "*Neitron's*"
46,	6th line,	for "*on Dissolving*" read "*as on Dissolving*"
—,	12th line from bottom	for "*giving*" read "*given.*"
—,	4th line,	for "*10d. per*" read "*10 or.*"
47,	6th line from top	for "£200" read "*200 Rupees*"
—,	——— ———	for "*half*" read "*one fifth*"
—,	6th line from bottom,	for "*Do*" read "*As*"
—,	5th ——— ———	for "*Become*" read "*Becomes.*"
—,	4th	Take out the note of "*Interrogation.*"